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MEDICAL BOTANY.

MEDICAL BOTANY:

OR

DESCRIPTIONS

OF THE

MORE IMPORTANT PLANTS USED IN MEDICINE,

WITH

THEIR HISTORY, PROPERTIES,

AND

MODE OF ADMINISTRATION.

BY R. EGLESFELD GRIFFITH, M.D.,

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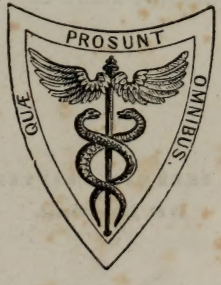
Scire potestates herbarum usumque medendi.—Æneid. xii. 396.

WITH UPWARDS OF THREE HUNDRED ILLUSTRATIONS.



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TO

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PROFESSOR OF CHEMISTRY AND BOTANY,

IN THE UNIVERSITY OF THE STATE OF NEW YORK,

AND

ASA GRAY, M.D. ETC.,

PROFESSOR OF NATURAL HISTORY,

IN HARVARD UNIVERSITY,

WHOSE NAMES ARE IDENTIFIED WITH

NORTH AMERICAN BOTANY,

THIS WORK

IS RESPECTFULLY DEDICATED

BY THEIR FRIEND

THE AUTHOR.

36780

PREFACE.

The work now offered to the Profession it is hoped may supply a deficiency that has long existed in our medical literature. In Europe many able treatises on this subject have appeared, but none have issued from the American press. It is true, we have some excellent publications on the Vegetable Materia Medica of the United States; one by Dr. Bigelow, and a second by Dr. W. P. C. Barton, both deserving of the highest praise, but both are now out of print, and are likewise too expensive for general use. To these may be added the "Medical Flora" of Rafinesque, which contains some important notices and facts as regards our native plants, but mingled with much that is incorrect and futile.

The student who wishes to obtain correct systematical descriptions of the various plants employed in medicine, must either consult a long series of expensive books, or be content with the short notices to be met with in the usual treatises on the Materia Medica, and hence the important subject of Medical Botany has been almost wholly neglected in this country. To supply this want, has been the aim of the author in the present publication, which, whilst it gives a general view of the Vegetable Materia Medica, is still sufficiently cheap to be within the reach of all.

It may be asked, will not the excellent works of Pereira, Royle, Ballard and Garrod, and Drs. Wood and Bache, supply all the botanical knowledge that is required by the student? We think not; the intention of the authors of these treatises is rather to present to their readers an account of medicinal articles, and of their composition and uses, than to dwell on the characters and history of those derived from the vegetable kingdom; at the same time, they all contain much that is interesting and important on these topics. The

work now offered to the Profession is intended as a companion to the more practical treatises, and also to convey such information on the systematic classification, characters, and history of Medical Plants as has been necessarily omitted in the publications alluded to.

In the execution of the plan, the author has experienced some difficulty in determining the limits of the work. To notice all the plants which have at different times been employed in medicine, or have had remedial properties assigned to them, would have been impossible in the compass of a single volume, and merely to describe those recognised in the Pharmacopœia would have militated against the object of the work. It was thought that the end would be best attained by dwelling at some length on the most important articles of the Vegetable Materia Medica, or on such as are involved in some obscurity as regards their botanical characters and history, and by noticing the others in a brief manner. In doing this, they have been arranged according to the natural orders, and it will be seen that the technical descriptions have been drawn up in strict accordance with the present improved state of botanical knowledge. These descriptions are selected from the best authorities; in some cases without alterations, but in others altered, corrected, or condensed, so as to present as great a uniformity of phraseology as possible. As the work is, from its very nature, a compilation, the only originality that can be claimed by the author is in the selection and arrangement of his materials.

To render the publication more generally useful, especially to those readers who are not conversant with Botany, a short Introduction on the Structure and Composition of Plants has been prefixed, with a copious Glossary of terms, and a Conspectus of the Natural Orders of Plants containing remedial substances; these it is hoped will add to the value of the work, whilst they do not materially swell its bulk.

In the present state of Botanical Science, the most eminent authorities disagree as regards the best mode of arranging the natural orders, and their exact relations with each other. In this country, the classification of De Candolle is best known, more especially as modified by Drs. Torrey and Gray. By some, however, that of Lindley is preferred, whilst others prefer the sys-

tem of Jussieu, &c. That adopted is founded on the views of De Candolle, but modified by those of Lindley, Gray, and others. The groups into which the orders have been divided, are mainly those suggested by the two latter authorities, but altered in some respects according to the views of the author.

It only remains to notice the sources from which the information contained in this work has been obtained. In the Introduction, much has been derived from Gray's "Botanical Text-Book," Reid's "Medical Botany," and Carpenter's "Vegetable Physiology." The Conspectus is principally founded on the views of Lindley and Gray, from whom the characters of the groups and orders have been adopted with certain modifications. In the main body of the work, information has been gleaned from every available source, but more especially from Lindley's "Medical Flora," and "Vegetable Kingdom," Merat and De Lens's "Dictionnaire de Matière Medicale," and also from the "American Dispensatory," and the respective treatises of Ainslie, Royle, Pereira, Dunglison, &c. As regards American Plants, the principal authorities have been Bigelow, W. P. C. Barton, Rafinesque, &c. Much has also been derived from the journals, and especially from the "American Journal of Pharmacy," and the "American Journal of Medical Sciences." In most cases it will be found that the authorities for the medical qualities ascribed to the species are those of the writers quoted in the Botanical references; where this is not the case, the exact authority for a statement is expressly mentioned.

The illustrations have been taken from the various works of Royle, Pereira, Rafinesque, &c., with the addition of numerous others from the masterly graver of Mr. Gilbert.

Philadelphia, May 1st, 1847.

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INTRODUCTION.

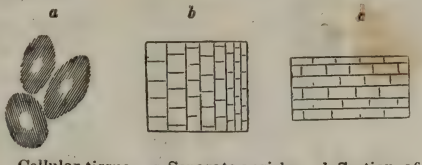
ANATOMY OF PLANTS.

VEGETABLE TISSUES.

On a microscopical examination of the organs, or parts of plants, they will be found to consist of vesicles, tubes, and fibres, constituting what is termed cellular, vascular, and woody tissues.

Cellular Tissue is of universal occurrence, no part being destitute of it, in some form, and many wholly composed of it. It consists of membranous vesicles or cells, cohering together. They are of various forms, depending on the circumstances under which they are placed. When first formed they are nearly globular or ovate, but when pressed together from any cause, they assume other shapes, and their sides become flattened; when the pressure is uniform, they become twelve-sided, or else cubical; when the pressure is lateral they assume a prismatical or cylindrical form. In general, this elongation takes place in the direction of the growth, but in the stems of many trees, there is a peculiar set of cells extending from the centre to the circumference, which are longest horizontally; the cells being of an oblong, flattened shape, and arranged like bricks in a wall. The cells contain fluid, and often solid matter. This tissue or parenchyma constitutes the pulpy and succulent parts of plants, the pith, the leaves, with the exception of the veins, a part of the bark, &c. It sometimes is so compressed as to be very hard, as in the stone of a peach.

Fig. 1.



Cellular tissue. *a* Separate vesicles. *b* Section of cubical vesicles of pith. *c* Section of flattened vesicles.

Woody Tissue has received the name of *fibre* from its always existing in an elongated thread-like form. It consists of vesicles of cellular tissue drawn out into tubes of great tenuity and toughness, each end tapering to a fine point. These tubes are closely applied to each other by their sides, so as to form cords or bundles of fibres. Woody fibre is designed to convey fluid in the direction of its length, and is readily permeated by it. This tissue is

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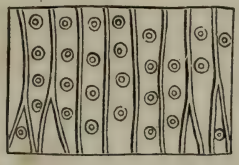
not confined to the wood, but forms part of the bark, the veins of leaves, &c. In coniferous trees, the fibres or tubes are not only larger than in

Fig. 2.

Bundle of Woody Fibre.

Fig. 3.



Woody Fibre of Pine.

other plants, but are also marked on their sides with circular dots or disks, the true office of which is not fully understood.

Vasiform Tissue consists of large tubes which are formed of cylindrical cells placed end to end, and opening into each other; the sides are marked with dots or pits. They have been termed dotted ducts, and were thought to be true vessels; these dots are caused by the unequal deposit of solid matter on their interior. They are the largest tubes in plants, and their orifices are conspicuous on the cross section of most kinds of wood.

Fig. 4.

Section of Dotted Duct.

Vascular Tissue consists of membranous tubes marked with transverse rings, or with a spiral fibre attached to their interior surface. This spiral fibre is the real type of the vascular tissue; the thin and delicate membrane covering the fibre being transparent the latter only is visible, and resembles a coil of slender wire. The spiral fibre is usually single, but is sometimes double, or even triple or quadruple. In their perfect state they contain air only. They may readily be seen in their unrolled form, by breaking almost any leaf stalk, and pulling the extremities gently asunder. In plants having pith, they are found in a circle around it.

Fig. 5.

Spiral Vessels. *a* Single. *b* Quadruple.

Fig. 6.

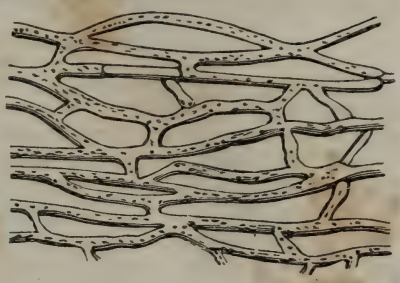
a Annular duct. *b* Spiro-annular duct.

Where the spiral fibre cannot be unrolled, the vessels are called *ducts*. Sometimes the turns of the coil are in contact, forming *closed ducts*, which so closely resemble spiral vessels as only to be distinguished from them, by their not being capable of being unrolled. There are others in which the turns are distant, or broken into separate rings placed at regular intervals; these are called *annular ducts*. Sometimes the coil terminates in a ring, and then commences again, with the intervention of two or three rings. Sometimes they cross each other, when they are termed *reticulated* ducts, or are broken into short, irregular bands. In some ducts again, no traces of spiral fibre are to be seen. Ducts of all these kinds occur abundantly in the woody tissue of most plants.

Lactiferous Tissue consists of a series of branching vessels, which freely

anastomose with each other, and are remarkable for their irregular contractions and expansions. Their sides are very delicate, and their average diameter is not more than one fourteen-hundredth of an inch. These vessels serve for the passage of the nutritious sap or proper juice of the plant; they are found in the under surface of leaves, and in the bark.

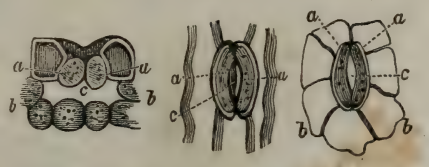
Fig. 7.



Lactiferous Vessels.

Every portion of the external surface of a plant is covered by a *cuticle* or *epidermis*, which consists of layers of cellular tissue, in which the cells are much flattened, and in close contact with each other. Their form is various, sometimes they are oblong and regular, whilst at others they are very dissimilar, and appear to interlock with each other. This cuticle is provided with small apertures, usually of an oval form, and bounded by two or more oblong or reniform cells placed side by side; and by their expansion or contraction, the opening is increased or diminished. These apertures are called *stomata*, and appear to subserve the functions of respiration and evaporation. They are chiefly found in the soft green tissue of leaves and young shoots, but may also be detected in the flowers.

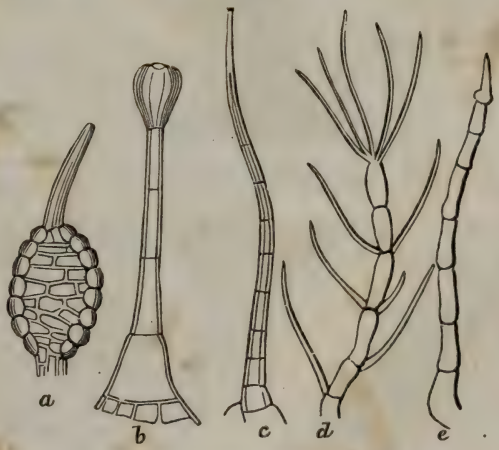
Fig. 8.



Stomata. *a* Cells of Stoma. *b* Cells of Parenchyma. *c* Opening of Stoma.

Glands are organs designed to elaborate peculiar secretions from the vegetable fluids. They are found on all parts of plants, and are of various forms and composition; some being composed merely of cellular tissue, whilst others contain in addition, a large number of vessels of different kinds. They have received various names, according to their form, but are not fully understood. Sometimes they are combined with *hairs*, which are expansions of the cellular tissue of the cuticle, consisting either of single elongated cells; of several cells placed end to end; or of cells branching from each other. These hairs may arise from a gland, or bear one at their apex.

Fig. 9.



Hairs and Glands of various kinds.

Prickles are also appendages of the cuticle, composed of indurated cellular tissue, and differ from *thorns* which proceed from the wood.

Organs of Nutrition.

The trunk or axis of a plant consists of two parts, growing in opposite directions; one, ascending or the stem; one, descending, or the root. The point of junction of these is called the *crown, neck, or collar.*

The *Root* is that part which descends into the earth, acts as a support to the plant, and absorbs nourishment from the soil for its sustenance. It differs from the stem, not only in its mode of growth, but also in being destitute of leaves and other appendages; in its epidermis being destitute of stomata and in not producing buds, except under peculiar circumstances. Roots, however, are not always produced under ground; they sometimes arise from any portion of the stem. Thus the branches of most woody plants, when bent down and covered with earth, will put forth roots. This takes place naturally in many trees in tropical climates, which give off roots from their trunk or branches, high above the earth. This phenomenon is very striking in the *Ficus religiosa* or Banian tree, and in the *Pandanus* or Screw pine. Roots also attach themselves to the surface of other vegetables, and thence draw their nourishment; plants of this character are called *parasitic.* Roots increase in length chiefly by the addition of new matter to their extremities. It is by these extremities, called *spongioles*, that absorption takes place. They are of various forms, the principal of which are, 1, *Conical* or *tap root*, which is unbranched, and tapers regularly from the crown to the apex, as in the carrot. 2. *Fusiform* or *spindle-shaped* resembles the first, except that it tapers upwards as well as downwards. 3. *Napiform* or turnip-shaped is much broader than long. The small branches of roots are called *fibrils* or *rootlets.* If the root divides immediately into fibrils, it is said to be *fibrous.* When these are thickened and dilated, it is *fasciculated*, as in the dahlia. Where it is furnished with knobs it is called *tuberous*, but it should be noticed that in some cases, what are called tuberous roots are in fact altered stems, as in the potato. Bulbs also, which are usually termed roots, are merely subterranean buds; so also, many creeping roots are really underground stems. The *Stem* is that portion of the plant which grows in an opposite direction to the root, and gives support to the leaves and organs of reproduction. All flowering

Fig. 10.

Pandanus with Aerial Roots.

plants have stems, but in some cases they are so short and concealed beneath the earth, as to be called stemless. Stems do not always ascend; sometimes they trail on the ground, or burrow beneath its surface. From the size and duration of the stem, plants are divided into *herbs* in which the stem is not woody, and dies after flowering; *under shrubs*, which are woody plants of small size, branched from the base; *shrubs*, which are similar, but of greater height; and *trees*, which attain a still greater altitude, and seldom bear branches near the ground. When stems are too weak to stand erect, they are said to be *decumbent*, *procumbent*, or *prostrate*, and when they strike root at certain intervals, they are called *creeping*. When they cling to surrounding objects for support, they are *climbers;* if they coil themselves around these objects, they are *twiners*. When the base of the stem sends off a prostrate, slender branch, which takes root and produces a new plant at its extremity, it is called a *runner*. An erect branch from the underground part of the stem, capable of producing leaves, and taking root, is termed a *sucker*. When the branch is from an aerial part of the trunk, and descends and takes root, it is a *stolon*. A *spine* is a short branch of a woody plant, arising from a bud; they sometimes bear leaves. A *tendril* is often a slender, leafless branch, capable of coiling round contiguous objects, so as to afford support to the stem; sometimes it is a modification of a leaf.

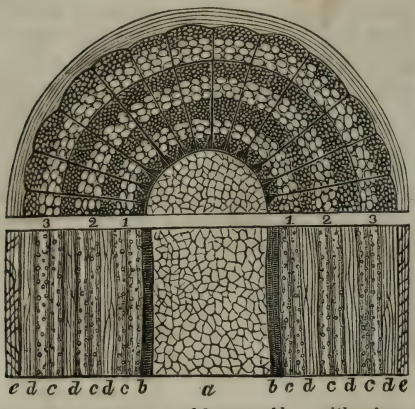
The forms of the stem when it is subterranean are fully as various, but may always be distinguished from roots by having regular buds, by scars indicating the insertion of former leaves, or by scales which are the rudiments of those organs. Where the stem is prostrate, lying either on, or beneath the surface of the ground and giving out roots from its under surface, it is called a *Rhizome*, as in the calamus. All the *scaly* and creeping roots of the older botanists belong to this class. A *Tuber* is a much thickened portion of an underground stem, furnished with eyes or latent buds, as in the potato. A *Cormus* is a dilated subterranean base to a stem, usually round or oval, and of a uniform texture, as in the Indian Turnip. A *Bulb* is an underground bud, mostly furnished with fleshy scales, producing roots from its base and a stem from its centre. Bulbs may be *tunicated* or composed of concentric layers, as in the onion, or *scaly*, formed of scales overlaying each other, as in the lily.

The structure of stems offers great differences in plants; it essentially consists of cellular and woody fibres embedded in cellular tissue, the whole covered by a skin or epidermis, but these fibres may be arranged in a dissimilar manner, principally, however, in two. In one called *exogenous*, the plant increases in diameter by successive additions of new layers to the circumference; in the other or *endogenous* by the deposit of new woody matter towards the centre, within or among the older tissue.

The stem of an Exogen is composed of three separate parts arranged concentrically; viz. bark, wood, and pith. The *bark* consists of an outer portion, or *cellular integument*, composed of cellular tissue, and covered by an epidermis; and an inner part or *liber*, in contact with the wood, and formed both of cellular and fibro-vascular tissue. At certain periods, a mucilaginous product is interposed between the bark and wood, which is called *cambium*, and is supposed to be the material from which new cells and vessels are formed. The *wood* consists of woody fibre, ducts, and vasiform, tissue arranged in zones. The *pith* consists of soft cellular tissue, at first abounding with nutritive matter, for the nourishment of the terminating buds, but afterwards becoming effete and dying. It is surrounded by a narrow zone of

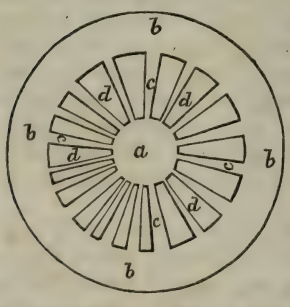
vascular tissue, which is called the *medullary sheath;* it is composed of woody fibre and spiral vessels, and is the only part of the stem in which these latter occur. Both this sheath and the wood are traversed by narrow plates of condensed cellular tissue passing from the pith to the bark, and denominated *medullary* rays. The number of zones or layers in a stem is in proportion to its age, each layer being the product of a single year's growth, hence the exact period of existence of the tree can be correctly ascertained from them.* The woody portion is also divided into two parts; one, exterior, new, colourless, and permeable to the circulating fluids, called *Alburnum* or *Sap wood;* the other central, denser, charged with certain secretions, and impermeable; this is termed *Duramen* or *Heart wood.* It is generally of a darker colour, and as it does not assist in maintaining the functions of the tree, it may decay, without any injury to the vitality of the plant. Each layer of wood consists of vessels or ducts and woody fibre. The first of these is the earliest formed, and therefore nearest the centre: the latter is not produced till a later period. Their relative arrangement, however, is not the same in different trees, and occasions the numerous varieties in the texture met with in woods. In the pine and fir tribe the structure is so dissimilar from that of other exogens that some botanists have thought that they constituted another class to which the name of Gymnogens has been given. There are no ducts in their wood, whilst the diameter of the tubes of the wood is greater than usual. Other remarkable deviations also occur; thus in *Calycanthus* the old stems have four distinct axes of growth between the regular wood and the bark. In the woody *Aristolochias* there are no regular zones or layers, the wood consisting of wedges separated by large medullary rays and arranged around the central pith.

Fig. 11.



Sections of an Exogen of 3 years old. *a* pith. *b* medullary sheath, exterior to which are 3 layers of wood, each formed of *c* dotted ducts and *d* woody fibre. *e* bark.

Fig. 12.



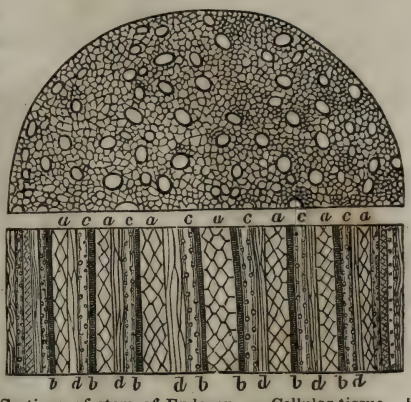
Exogenous stem. *a* Pith. *b* Bark. *c* Medullary rays. *d* Bundles of woody fibres.

The stem of an Endogen presents no distinct separation into pith, wood, and bark. The woody portion consists of bundles of fibres distributed throughout a cellular tissue, and not presenting any appearance of zones. These fibrous bundles arise from the leaves and pass downwards towards the interior part of the stem, and afterwards turn outwards and mingle

* This is strictly applicable only to trees in temperate and cold climates, which change their leaves but once every year. In tropical regions, there is reason to believe that more than one layer is deposited annually. From some observations made in the West Indies several years since, we were led to this view of the subject, and are glad to find that Dr. Carpenter entertains the same views. (See Veg. Physiology, 98.)

themselves with those of previous formation. In this way the external part of the stem becomes very hard, both by this interlacement and from the pressure from within. The whole is enclosed in an integument, which is unlike the bark of an exogen, in not increasing by layers and in not being separable from the tissue beneath. In this stem, although containing the same elements as in that of an exogen, the arrangement is widely different, the cellular tissue and woody fibre being intermingled throughout the whole diameter. In many cases the stem of an endogen grows by a terminal bud only, as in the palms, and hence is nearly cylindrical. When lateral buds are developed, it is conical, as in Asparagus, &c.

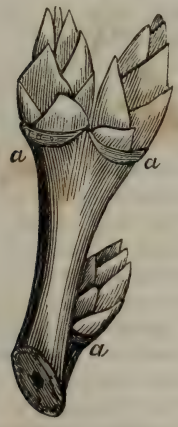
Fig. 13.



Sections of stem of Endogen. *a* Cellular tissue. *b* Spiral vessels. *c* Dotted ducts. *d* Woody fibre.

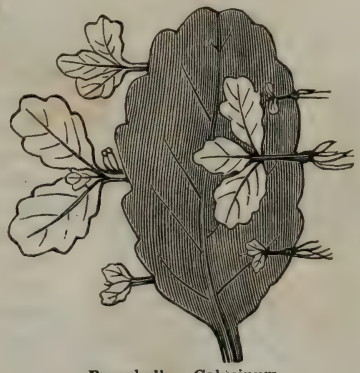
Buds are undeveloped branches or terminations of stems, covered with the rudiments of leaves. The stem commences from a bud, and is always terminated by one. In cold or temperate climates, during the winter, the buds are covered close by overlapping scales as a protection from the severity of the weather. These scales are merely rudimentary leaves. In warm climates, buds are not provided with this defence. All buds are terminal or axillary,

Fig. 14.



Leaf bud. *a a* Marks of attachment of former leaves.

Fig. 15.



Bryophyllum Calycinum.

and hence the arrangement of branches depends upon their peculiar disposition. If the buds are alternate, the branches will likewise be so; if they be opposite, the branches will also be opposite. Irregular or adventitious buds are sometimes produced from the root or from the stem, especially if the bark be wounded—or they may even arise from the surface or margins of leaves, as in the Bryophyllum.

Leaves are membranous organs of various forms growing from the stem or branches, and situated immediately below the buds. They may be considered to consist of an extension of the skin or cuticle of the plant into a flat expanded surface, which is supported by a network of fibres and vessels derived from the medullary sheath. Leaves, according to arrangement, are *alternate*, *opposite*, or *verticillate*, the first distribution being considered the most normal. When leaves arise immediately from the stem they are called *sessile*, and when the fibres are clustered together for a certain distance before they expand, this is termed a *petiole*. The leaf therefore consists of two parts, the stalk or petiole and the expansion or lamina, blade or disc.

Fig. 16.

Different ascidia. *a* Sarracenia. *b* Nepenthes. *c* Cephalotus.

Sometimes, as in the Australian Mimosæ, the lamina is wanting, and the petiole is dilated into a kind of nerved leaf called a *phyllodium*. Other plants, instead of leaves, have *ascidia* or pitchers, and these also are usually altered petioles. These ascidia are of various forms, and their true functions are not understood.

Fig. 17.

a Ranunculus aquitilis. *b* Jatropha. *c* Passiflora. *d* Sterculia planifolia. *f* Dichondra. *g* Asarum.

The projecting lines on the under surface of a leaf are termed *veins* or *nerves*, and their distribution *venation*, and the form of the leaf depends, in a great measure, on the distribution of these veins. The general outline is regulated by their division and direction; but the form of the margin is dependent on the greater or less quantity of parenchyma in which the veins are distributed; hence with the same venation, there may be several different forms of leaves. Most leaves are divided into two lateral halves by a prominent vein extending from the base to the summit, called the midrib; from it the other veins proceed and ramify in all directions. In Exogens these veins form a kind of network, frequently anastomosing with each other; these are *reticulated* leaves. In Endogens the veins or nerves proceed directly from the base to the apex, or diverge regularly from the midrib, are parallel to each other, and have few ramifications; these are *parallel veined* leaves.

Leaves may be *simple* or *compound*. In the first, the petiole is undivided, and the lamina consists of a single piece. A compound leaf consists of several leaves or *leaflets* attached to a common petiole or *rachis*, quite distinct and separate from each other. The forms of simple leaves are exceedingly numerous and diversified, and should be attentively studied by the botanist, as regards their contour, insertion, superficies and texture. A compound leaf may be *pinnate*, or where a single series of leaflets arises from the petiole; *bipinnate* where a secondary series of petioles arises from it, also bearing a second series of leaves; this division may go farther, and hence *tripinnate*, &c. In the disposition of the leaflets a leaf is said to be *abruptly* pinnate, where the leaflets are even, and there is no odd terminating one; *impari-pinnate* where this terminating leaflet is present. The number of leaflets varies from very few to many, and they may present all the diversities of form exhibited in simple leaves. Sometimes these forms are strangely intermixed on the same plant, a striking example of which often occurs in the honey locust.

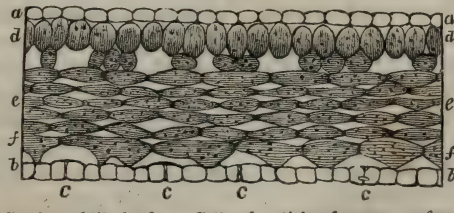
Fig. 18.

Leaf of Gleditsia.

According to their duration, leaves may be *caducous*, when they fall early; *deciduous* when they are shed before the appearance of the new leaf; *marcescent* when they wither before being detached; and *persistent* when they remain attached one or more seasons. In general, they are annually produced in the spring, and fall off in the autumn. Plants which are destitute of these organs are called *aphyllous*. As regards their position on the stem, leaves are said to be *radical* when they are inserted into it, at or below the surface of the ground; and *cauline* when they arise from the stem at a higher point.

The internal structure of a leaf consists of two sets of veins or vessels, one belonging to the upper surface, and conveying the sap of the plant to the expansion; the other belonging to the under surface, and returning the elaborated juices to the bark. These ramify through a cellular tissue called parenchyma, and containing numerous green globules termed *chromule* or *chlorophyllin*, to which the colour of the leaf is owing. These globules are differently arranged in the two strata of vessels; in the upper one there are usually two or more layers of compact oblong vesicles, having their long diameter perpendicular to the surface; in the lower surface, these vesicles are very loosely arranged, having numerous vacant spaces between them, communicating with the external air by means of stomata. In aquatic plants whose leaves float on the

Fig. 19.



Section of lily leaf. *a*. Cells of cuticle of upper surface. *b*. Cells of cuticle of lower surface. *c*. Stomata. *d*. Parenchyma of upper surface. *e, f*. Parenchyma of lower surface.

water, the upper surface is provided with these stomata. The leaves of succulent plants, as the Cactus, have but few stomata, and hence have great power in retaining the fluids absorbed by their roots.

Stipules are small leafy appendages at the base of a petiole or sessile leaf, of the same structure as the leaf. They do not occur in the larger proportion of plants, and are always wanting in Exogens; where their margins unite so as to form a sheath round the stem, they are called *ochreæ*. Leaves having stipules are said to be *stipulate*, and when wanting these appendages to be *exstipulate*.

ORGANS OF REPRODUCTION.

The organs of reproduction are those designed for the continuation of the species. Every plant possesses some means of reproducing its kind, but these differ exceedingly in the various tribes, from the simple evolution of new cells in the lowest classes, to the complicated apparatus in the higher orders, of which latter only, we shall speak at present.

THE INFLORESCENCE.

This term is used to express the manner in which flowers are arranged on the plant. Flowers are called *solitary* when a terminal or axillary bud is transformed directly into a flower. *Opposite the leaves* when the flower is at the same height on the stem, and opposed to a leaf. *Axillary* when in the axilla of a leaf. *Extra-axillary* when the flower grows from the side of the origin of a leaf. *Epiphyllous* when arising from a leaf, and *Terminal* when borne at the extremity of a stem or branch.

When a flower is attached to a stem or branch by means of a stalk, this organ is called a *peduncle;* when there is no peduncle, the flower is sessile. The peduncle is called a *scape* when it grows from the root. When it is branched, each of the divisions is called a *pedicel*.

Flowers are said to be in the form of a *spike* when they are sessile, and placed simply along a common axis. A *raceme* is the same, except that the flowers have pedicels. A *spadix* is a spike in which the flowers are close set and enclosed in a spathe. A *panicle* is like a raceme, but the pedicels are branched, long and distant. A *corymb* is the same as a raceme, with the lower pedicels elongated so as to bring all the flowers on the same level. In an *umbel* the pedicels arise from the same point, and diverge like rays. In a *cyme* the pedicels do not proceed from one central point. A *thyrsus* is a panicle in which the pedicels are irregularly divided, the middle ones often longer than the rest. A *whorl* is where the flowers are arranged in a ring round the stem or branch. A *catkin* or *ament* is a spike with scaly bracts, crowded together and usually falling off in a single piece. A *head* or *capitulum* is formed of sessile or nearly sessile flowers, arranged in globular form, its axis or rachis is called the *receptacle*.

When the leaves which have flowers developed in their axils are smaller or different from the common leaves of the plant, they are called *bracts*, those of a very small size and near the calyx, are termed *bracteoles*. When they are set in a whorl at the base of the flower, it is called an *involucre*, and if round a pedicel it is an *involucel* or partial involucre. A *spathe* is a large bract or modified leaf enclosing flowers, before their expansion, and opening longitudinally to make way for them. A *glume* or husk, peculiar to the grasses, is something between a bract and a calyx; within these are often more delicate leaves or scales, which are called *paleæ* by some botanists; this

term is also applied to the small bracts surrounding the separate florets in compound flowers.

Flower buds open in a definite order; in some plants the upper and central flowers expand first, and then the lower or outer ones in regular succession. This is termed *centrifugal*. In cases where the lower and outer buds open first, and afterwards the upper and central, it is termed *centripetal*.

The Flower.

A complete flower consists of two series of leaves of a peculiar character, called *floral envelopes;* of *stamens*, or fertilising organs; and one or more *pistils* or seed-bearing organs. The outer envelope is called the *calyx*, and its leaves are termed *sepals*. The inner is called *corolla*, and its leaves *petals*. These two envelopes collectively are called a *perianth;* when both are present, the plant is said to be *dichlamydeous;* where only one, whatever may be its form or appearance, it receives the name of calyx, and the plant is said to be *monochlamydeous;* when neither are present, the plant is called *achlamydeous*.

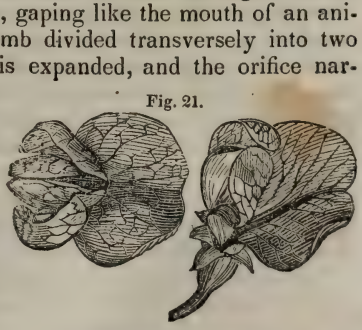
Calyx. When the sepals are united so as to form a more or less perfect tube, it is said to be *monosepalous* or *gamosepalous*. The lower part is called the *tube*, and upper and expanded portions, the *limb*. When the sepals are separate and distinct, it is *polysepalous*. When it adheres to the ovary and invests it, it is said to be *superior*, and when no such combination takes place, to be *inferior*.

Corolla. When the petals unite at base into a tube, it is said to be *monopetalous* or *gamopetalous;* when not united to be *polypetalous*. A monopetalous corolla may be regular or irregular. It is *regular* when its figure is uniform, and its incisions equal. The regular monopetalous corolla may be *campanulate* or bell-shaped; *tubular*, having the tube long and cylindrical; *funnel-shaped*, having the tube narrow below and widening towards the limb; *salver-shaped*, with the tube long and narrow, and suddenly dilating into a broad horizontal limb; *rotate*, like the last, but with a short tube; *ventricose* or urceolate or pitcher-shaped, contracted at the orifice. It is irregular when the incisions are not uniform, and the opposite sides are not arranged on the same axis. It may be *ringent* or bilabiate, gaping like the mouth of an animal, the tube widening above, and the limb divided transversely into two unequal parts; *personate*, when the tube is expanded, and the orifice narrowed by the approximation of the two lips. A polypetalous corolla also may be regular or irregular. The lower part of the petals is called the *claw*, and where this is well marked, they are said to be *unguiculate;* the upper and spreading portion is termed the *lamina* or border. The regular polypetalous corolla is *cruciform*, when there are four petals arranged in the form of a cross; *rosaceous* when the petals, with little or no claw, spread out as in the rose; *caryophyllaceous* when the petals have long claws,

Fig. 20.

Monopetalous corolla. *a* Regular. *b* Monstrous.

Fig. 21.

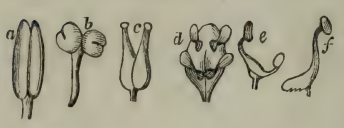


Papilionaceous flowers.

as in the pink. The irregular polypetalous corolla is *papilionaceous* when there are five petals, the upper and posterior of which is broad and dilated (*vexillum* or *standard*); the two middle and lateral parallel to each other (*alæ* or *wings*); and the two lower also parallel and united below (*carina* or *keel*). There are many other irregular forms, but it is impossible to class them.

Stamens are the male organs of a plant, and are situated within the floral envelopes. They vary in number in different flowers. A stamen consists of two parts, the *filament* and *anther;* the former supports the latter, and is a long slender body, containing numerous spiral vessels; it is said to be *prominent* when it projects beyond the anther, *petaloid* when it is broad and thin. They vary in number and position in different plants, but are usually more numerous than the pistils. Where there is one stamen the plant is said to be *monandrous*, where two, *diandrous* (see classification); when four, of which two are longer than the others, it is called *didynamous;* when six, of which four are longer, *tetradynamous;* when united by their filaments, they are called *monadelphous*, *diadelphous*, &c., according to the number of bundles into which they are formed; when they are united by their anthers, they are called *syngenesious;* when seated on the pistil, they are *gynandrous*. When stamens are longer than the corolla, they are termed *exserted;* when shorter *included*. The *anther* is the essential part of the stamen, and contains the *pollen*. It is of a cellular texture, and usually consists of two *cells* or *lobes*, attached to a prolongation of the filament called the *connectivum*. Its attachment may be in one of three modes; by its back, when it is *adnate;* by its base, when it is *innate;* or by a single point, so as to hang loosely, when it is *versatile;* when the filament is on the outside of the anther, so that this latter faces the pistil, it is termed *introrse;* when it looks away from the pistil and towards the petals, it is called *extrorse*. Each lobe is commonly marked with a furrow; this is the *suture* or *line of dehiscence*, by which the anther opens; but anthers may dehisce in other modes; some open by a transverse slip, some by pores or chinks at the apex; or by valves, as in the Barberry, when the whole side of the cell is detached, and turns back as on a hinge. Sometimes anthers are one-celled by the suppression of one lobe, or by the disappearance of the partition.

Fig. 22.



Various forms of stamens and anthers. *a* Lilium. *b* Lemma. *c* Solanum. *d* Berberis. *e* Zingiber. *f* Salvia.

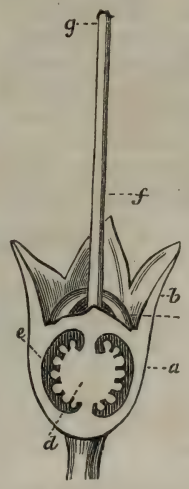
The *pollen* is a very fine powder, contained in the cells of the anther. It consists of small vesicles containing a mucous fluid (*fovilla*); it is usually of a yellow colour. The form of the vesicle or grains is usually spheroidal, but occasionally cylindrical, many-sided, &c. They have two coats, the outer, called *extine*, and the inner, *intine*. The grains are generally distinct from each other, but in Oenothera they are connected by cellular threads, and in Mimosa are coherent in small masses, and in the Orchidaceæ and Asclepiadaceæ are united in one or more groups, called *pollinia*. These, in the former class, have an elastic stalk or *caudicle*. When ripe, the pollen grains burst, and the inner membrane protrudes, constituting a channel for the transmission of the *fovillæ* to the ovule.

The *disk* is a ring, either entire or lobed, or a row of fleshy bodies, sometimes intervening between the stamens and pistils, around the base of the latter, when it is *hypogynous;* or partly covering the ovary, with the stamens arising from it; or adhering to and lining the tube of the calyx, when

it is *perigynous;* or when the calyx adheres to the ovary, it appears on the summit of the latter, and is *epigynous*. In such case, when confluent with the base of the style, it is called a *stylopodium*. The insertion of the stamens and position of the disk always correspond, hence the same terms are employed to designate the origin of the former as are employed to denote the situation of the latter.

Pistil. This consists of three parts; the *ovary* or germ, the *style*, and the *stigma*. The number of pistils is very various in different plants; where there is one, the flower is said to be *monogynous*, where two, *digynous*, &c. (see Linnæan classification.) The pistil is sometimes attached to the receptacle by a prolongation of the substance of the latter, called a *gynophore*, as in the Strawberry where the eatable part is the gynophore.

Fig. 23.



Pistil of Vaccinium amœnum. *a* Ovarium. *b* Calyx. *d* Placenta. *e* Ovules. *f* Style. *g* Stigma.

The *stigma* is of a glandular nature, and is usually covered with a viscid fluid; it is destitute of a cuticle, and is essential, as it receives and exercises a peculiar action on the fecundatory pollen. It is called *sessile* when the style is wanting, being then placed immediately on the ovary.

The *style* is the long cylindrical column arising from the ovary and terminated by the stigma. It is sometimes articulated with the ovary, in which case it falls off when it has performed its function; and sometimes is continuous with it, when it is persistent. It is not essential, and is frequently absent. Usually it arises from the summit of the ovary, but sometimes from the side of it, when it is termed *lateral*. The *ovary* is the lower and thicker part of the pistil, and contains the ovules. A single pistil consists of a transformed leaf folded inwards, with the margin united. The line formed by the union of these margins is called the *ventral suture;* the opposite line, representing the midrib, is termed the dorsal suture. The surface of the pistil, of course, corresponds to the lower, and its interior to the upper surface of the leaf. The stalk of the pistil, if present, answers to the petiole; and a prolongation of the apex of the changed leaf, forms the style. The leaf, in this modified state, is called a *carpel*. When there is only one cell in an ovary, it has been formed of a single carpel, or of several with the divisions obliterated. In a many-celled ovary each cell is formed of a single carpel, and the divisions or partitions are called *dissepiments*. They are formed of two layers, and are vertical; and

Fig. 24.

Change of leaf into pistil. *a* Carpellary leaf. *b* Pistil. *c* Double leaf. *d* Double pistil.

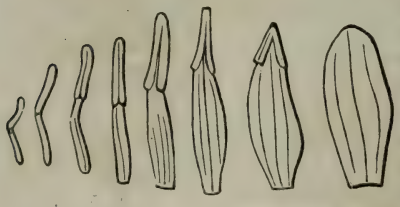
Fig. 25.

Pistil of Coriaria myrtifolia, showing distinct carpels and styles.

an ovary is *unilocular*, *bilocular*, &c., according to the number of the cells. When the margins of the carpel unite, there is a ridge or suture, called the *placenta;* this is *central* when the carpels are developed round a central axis; *parietal* when, from the contraction of the dissepiments, projecting from the inner surface of the ovary, but not dividing it into cells, the ovules are placed near or on the walls of it. When there are several carpels united in one mass, the pistil is said to be *syncarpous;* where they are more or less separated, it is called *apocarpous.* When an ovary forms no adhesion to the sides of the calyx, its base and that of the stamens being inserted into the top of the receptacle, it is said to be *superior*, and they are *inferior* or *hypogynous;* when it adheres to the side of the calyx, and the stamens and corolla are inserted into the latter, or into a disk above the ovary, it is termed *inferior*, and the other organs *superior* or *epigynous.*

A flower being a transformed branch, each row or set of organs is a whorl of leaves which has undergone a peculiar change, and hence there is a gradual transition of ordinary leaves into those of the calyx, of the latter into petals and of these into stamens, and *vice versa.* In some plants the transition from the form of petal to that of stamen is very marked; this is the case in the water lily, in which there are several rows of petals, the outermost of which are scarcely different from the calyx, whilst the innermost are neither petals nor stamens, but appear intermediate between the two,—being petals bearing an imperfect anther; the next series are more reduced in size and have perfect anthers, until finally perfect stamens make their appearance. In what are called double flowers, the reverse takes place and the stamens are converted into petals. A complete and regular flower should consist of four whorls of an equal number of parts, alternate with each other. Thus if the calyx have five sepals, the corolla should consist of five petals, alternate with the sepals, the stamens be five, alternate with the petals, and the pistils five, alternate with the stamens. This typical condition is, however, by no means constant, being altered by a variety of causes; as the production of one or more additional whorls of some of the floral organs; by the union of the parts of the same whorl; by a cohesion of their contiguous margins; by a cohesion of adjacent parts of different whorls; by the suppression or abortion of some of

Fig. 26.

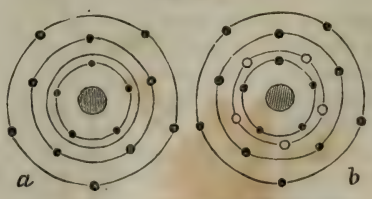


Transformation of petals of Nymphæa into stamens.

Fig. 27.

Plan of flowers. *a* Cherry. *b* Squill.

Fig. 28.



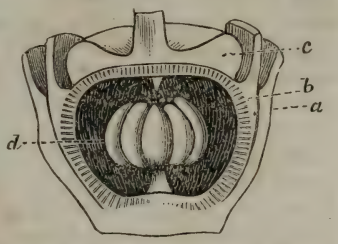
Plans of flowers. *a* Primrose. *b* Samolus.

the parts of a whorl, or of one or more of the whorls; by an unequal developement or unequal union of different parts of a whorl; by changes in the form

of the receptacle or axis of a flower, &c. For example, in the cherry there are five sepals, five petals alternate with them, but the stamens are twenty, but these may be viewed as forming four whorls with five stamens in each. In the Squill the parts are disposed in threes, here the sepals and petals are normal, but the stamens are six in two rows, the outer one alternate with the petals and the inner alternate with the outer. So, also, by irregularity from abortion, in the Primrose the sepals, petals and stamens are normal as to number, but the latter are opposite the petals instead of being alternate with them; to account for this, we must suppose a row of undeveloped stamens between those present and the petals; this is the case in Samolus, which has five small scales or aborted stamens in such a situation. A multitude of other examples might be adduced, but these are sufficient to explain the theory.

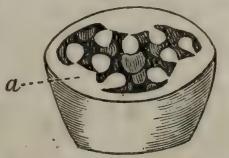
The *Ovule* is the rudiment of the future seed. Ovules are attached to the placenta, either immediately or by a short stalk, called *funiculus* or *podosperm*. They vary in number; where there is one, it is said to be *solitary*, where their number is uniform and not numerous, they are said to be *definite*, where they are very numerous, to be *indefinite*. They also vary as to situation and direction with respect to the cavity in which they are contained; thus they are *ascending* when they are fixed to the placenta above the base, and directed upwards; *horizontal* when they project from the side of the cell; *pendulous* when their direction is downwards; and *suspended* when they are affixed to the top of the ovary, and hang perpendicularly.

Fig. 29.



Ovary of *Thamnia*. *a* Calyx. *b* Ovary. *c* Disk. *d* Ascending ovules.

Fig. 30.



Ovary of Viola *a* Placenta with horizontal ovules.

The ovule consists of a *nucleus*, enclosed within two sacs called the *primine* and *secundine*. Each of these sacs have open mouths; that of the first termed *exostome*, that of the latter *endostome;* these contract as the ovule changes to a seed, and become connected; the small aperture, or the scar indicating its position, is termed *foramen* or *micropyle*. The sacs and nucleus are distinct and unconnected, except at base, where they are confluent, and the point of union is the *chalaza*. In what may be considered as the typical condition, the two coats and nucleus are connected to each other at the base of the ovule, that is, next the placenta, and the axis is rectilinear, the foramen being opposite the chalaza; such an ovule is called *orthotropous;* but it often happens that a change takes place during its growth, consisting either in its complete inversion upon the funiculus, so that the apex is brought down by the side of the stalk and points towards the placenta, when it is termed *anatropous;* or the ovule curves upon itself and thus brings the apex near the stalk, in which case it is *campylotropous*. In anatropous ovules the stalk adheres strongly to the part of the surface to which it is applied, and the ripe seed breaks away at the point where it is free from the coats or skin, to which the adherent portion remains attached. This receives the name of *Raphe*, and appears in the form of a ridge, passing from the *Hilum* or scar left by the detachment of the stalk from the seed, to the chalaza. The raphe is only found in anatropous seeds, in all others the hilum corresponds to the chalaza, whilst in these they occupy opposite extremities of the seed.

The Fruit.

The fruit is composed of the ovary and its contents, arrived at maturity and usually changed in texture. It consists of two parts, the covering *pericarp* or *seed vessel*, and the *seeds*. When the floral envelopes are not adherent to the ovary, they usually wither or fall off soon after fecundation; but when coherent they become a part of the fruit. Thus in the apple and pear, the most of the bulk consists of a thickened and fleshy calyx; but the mass is sometimes made up from other organs as in the strawberry, in which the pulp is an enlarged and fleshy receptacle, &c.

A *Pericarp* is almost always present, though sometimes very thin, as in the umbelliferous plants, but may be wholly wanting as in the Pine Tribe. The part by which it is attached is called the *base*, and the other extremity the *apex;* the imaginary line passing from one of these points to the other is called the *axis*. When there is a real axis it is called a *cotumella*. This is formed by the extension of the peduncle or by a cohering placenta. When the pericarp consists of two parts, the outer is called the *epicarp*, and the inner the *endo carp* or *putamen;* when it consists of three portions, the intermediate is usually pulpy or fleshy and is termed *sarcocarp* or *meso carp;* thus in the cherry the skin is the epicarp, the flesh the sarcocarp, and the hard shell containing the seed the endocarp.

A pericarp consisting of one cell is called unilocular; of two cells, bilocular, &c. The cells are separated by partitions called dissepiments. As the fruit is only a matured pistil, it should agree in structure with it, but some alterations occasionally occur in consequence of the abortion or obliteration of parts, or of the irregular growth of others. Thus a many-celled ovary may afford a one-celled pericarp; as in the oak, where the ovary is three-celled with a pair of ovules in each, whilst in the acorn there is but one cell and a single seed. On the other hand, the fruit sometimes has more cells than existed in the ovary, as in the Stramonium in which a two-celled ovary becomes a four-celled pericarp, caused by the growth of the placenta on each side, so as to reach and connect with the dorsal suture. When the mature fruit does not open spontaneously to permit the escape of the seed, it is called *indehiscent;* when it opens to discharge its contents it is termed *dehiscent*, and the pieces into which it divides are denominated *valves*. Pericarps formed of a single carpel, have two marked lines on their surface, by which they readily dehisce; one is called *dorsal*, and occupies the place of the midrib of the leaf become a carpel; the other is termed *ventral*, and answers to the lines of union of the margins of the leaf. In a many-celled pericarp, each cell or carpel has these sutures more or less distinctly marked.

The dehiscence is *loculicidal* when the pericarp bursts vertically at the back of the cells or by the dorsal suture; it is *septicidal* when it bursts longitudinally through the dissepiments, and usually by the ventral suture. Sometimes the dissepiments remaining coherent in the axis separate from the valves; this form is called *septifragal*. Occasionally the dehiscence is transverse, taking place across the sutures, the upper part falling off like a lid; this is called *circumscissile*. The pericarp may also open by pores, or irregular openings at or near the apex. There are several other irregular varieties of dehiscence, but they do not require particular notice. When the pericarp has lateral appendages like wings, it is said to be *dipterous*, *tripterous*, *&c.*, according to their number; where there are none, it is *apterous*.

The pericarp is of various forms, and these have been named as follows:

Follicle, a fruit of a single carpel, dehiscing by the ventral suture, as in the larkspur. *Legume* or pod, a fruit of a single carpel, opening by both the ventral and dorsal sutures, so as to separate into two valves. When a legume is divided into joints it is called a *Loment;* these joints are sometimes indehiscent, and sometimes dehiscent. A *Drupe* is a more or less fleshy fruit, containing an indehiscent stony one-celled nut; where there is more than one cell, it is called *drupaceous*. An *Achenium* is a dry, indistinct, one-seeded pericarp, often terminated by the persistent and plumose style, called *pappus;* in the Rose the achenia are seated on the hollow expansion of the receptacle; in the Strawberry they are on the surface of the pulpy receptacle. A *Cremocarp* is a pair of achenia placed face to face, and covered by the calyx tube, and when ripe separate from each other, or from a central axis, called *carpophore*, as in the umbelliferous plants. Each half fruit is called a *Hemicarp* or *Mericarp*. A *Caryopsis* is a dry one-seeded pericarp, closely adhering to the integument of the seed, so as not to be separated from it, as in Indian corn, wheat, &c. A *Utricle* is like a caryopsis, but the pericarp is separable from the seed as in Chenopodium. A *Nut* is a one-celled, one-seeded, indehiscent fruit like an achenium, but produced by an ovary of two or more cells, with one or more ovules in each; all but a single ovule and cell disappearing at maturity; the nut is sometimes enclosed or surrounded by a kind of involucre called a *cupule*, as the cup in the acorn, and bur in the chestnut. A *Capsule* is a dry, many-celled pericarp, resulting from a compound ovary, and opening by valves or pores. A *Siliqua* or pod isa two-valved oblong pericarp, rendered two-celled by a spurious dissepiment, formed by an extension of the placenta; when it is broad and short it is called a *Silicula* or pouch.

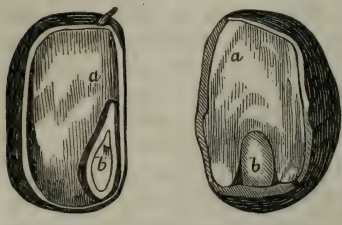
A *Pyxidium* or *Pyxis* is a capsule which dehisces transversely. A *Samara* is a nut or achenium with a winged apex or margin. A *Pome* is a fruit composed of a fleshy or juicy calyx, enclosing two or more cartilaginous or bony carpels. A *Pepo* is an indehiscent, fleshy, or internally pulpy fruit, usually formed of three carpels, invested by the calyx, and with a firm rind. A *Berry* is an indehiscent fruit, fleshy or pulpy throughout; a *Hesperidium* or orange is merely a berry with a coriaceous rind. A *Strobile* or *cone* is the collective fruit of the fir tribe; each scale represents an open carpel, bearing one or more naked seeds.

Seed. The seed like the ovule, consists of a nucleus usually enclosed in two integuments. The outer of these is called *testa* or *episperm*, and varies much in texture and form. It is sometimes furnished with a tuft of hairs at one end called a *coma;* or is wholly covered with a long wool. The inner integument, corresponding to the secundine of the ovule is termed *tegmen*. Where the proper coat of the nucleus is visible, it is denominated *endopleura*. Seeds are sometimes furnished with a complete or partial covering, exterior to their proper coats, from an expansion of the placenta, or of the apex of the funiculus; this is called *arillus* or *aril*, as the mace of the nutmeg. The scar left by the separation of the seed from its stalk is termed the *hilum*.

The *nucleus* or kernel consists of the *albumen*, and the *embryo*. The *albumen* is a mucilaginous or amylaceous substance contained in the cellular tissue of the nucleus, for the protection and nourishment of the embryo. It is *mealy* in the grasses, *horny* in the coffee, &c., oily in the poppy, &c., and fleshy in most seeds. Where it has a wrinkled or folded appearance, from not being deposited uniformly, it is said to be *ruminated*. The albumen is not essential, and therefore is wanting in many seeds, as in all the cruciferous plants, the pea tribe, &c. Where it is present, seeds are said to be *albuminous;* where it is wanting, to be *exalbuminous*.

The *embryo* or rudiment of the new plant is produced within the sac of the amnios, which is mostly absorbed during its growth, but sometimes remains in the form of a bag, called the *vitellus*. Where no albumen is present, the whole substance of the nucleus is absorbed, and the embryo occupies its place. The embryo consists of one or more lobes, called *cotyledons*, which surround the terminal bud called the *plumule*, and the portion which becomes the root, termed the *radicle*. In some rare cases the embryo is destitute of cotyledons; these plants are called *acotyledonous;* where there are two cotyledons they are *dicotyledonous;* this is the case in all the exogenous plants; where there is but one cotyledon, they are *monocotyledonous*, as occurs in the endogenous plants.

Fig. 31.



Seed of onion. *a a* Albumen. *b* Embryo.

The embryo is either *straight*, or *curved*, or *spiral*. Its position as regards the albumen, when this is present, is usually in its axis; but it is sometimes *eccentric*, as in the palms; or *external*, as in Indian corn, &c.; where it is external, or nearly so, and curved round the albumen, it is *peripheric*. When it is so bent that the radicle is placed against the edges of the cotyledons, the latter are said to be *accumbent*, and when the radicle rests against the back of one of them, they are termed *incumbent*. The radicle always points to the micropyle; and the apex of the cotyledons, except when spiral, to the chalaza.

VEGETABLE PHYSIOLOGY.

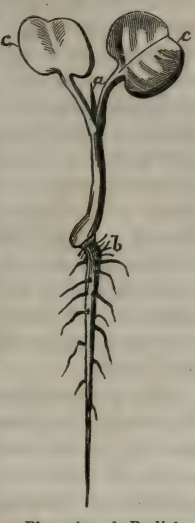
Propagation of Plants.

Germination. A perfect seed may be considered as a plant, whose vital energies are in a dormant or latent state, requiring the concurrence of certain circumstances, to call them forth and to produce such a condition as to fit it for an independent existence. Seeds retain this latent vitality for periods varying much in different plants; some losing it in a few months, whilst others retain it for an indefinite period. The conditions requisite for germination, are, moisture, the presence of air, the absence of direct light, and warmth. Moisture probably acts in several ways; it softens the integuments, pervades and softens the nutritive matters, and thus brings them to a fit state to be absorbed by the embryo; conveys in solution nutritive particles from other sources; and by its own decomposition affords two of the most important ingredients of vegetable bodies. The presence of air is necessary, because the oxygen contained in it causes a change in the starch contained in the albumen or cotyledons, and converts it into a semi-fluid substance consisting of sugar and gum, and combines with some of the carbon, forming carbonic acid which escapes, whilst the proportion of oxygen and hydrogen are augmented. The absence of light is favourable, as its presence has a tendency to produce an opposite change, the accumulation of carbon. Heat promotes the necessary chemical changes, and assists the moisture in acting on the hard parts of the seed; and also probably acts as a stimulus to the absorbents of the embryo. The degree of heat required is much the same in similar species, but varies greatly in different plants; thus the seeds of some plants will germinate at a temperature near that of 32°, whilst those of others require a heat of 90° to 110°. Seeds germinate most freely in spring and

summer, as at these periods, the requisites for this process are all afforded to the fullest extent; this is also favoured by covering them loosely with soil, so that whilst the light is excluded, they may experience the vivifying influence of the sun's rays, and at the same time be kept in a moist state. When planted at too great a depth, they remain torpid, from not receiving the stimulus of air; and when they have not a proper covering of earth, they do not germinate, from not obtaining sufficient moisture.

When germination commences, the moisture absorbed softens all parts of the seed, a chemical change takes place in the starch of the embryo or cotyledons; the embryo enlarges and bursts the integuments; the radicle protrudes and descends, often attaining some length before the plumule appears; the albumen is gradually absorbed; the cotyledons expand and become seminal leaves, which afford nourishment to the young plant, by elaborating sap, and wither when the true leaves appear or remain under the surface, and are gradually absorbed and disappear. As soon as the root and leaves are developed, in opposite directions, the process of germination is perfected, and the new plant is formed.

Fig. 32.



a Plumule. *b* Radicle. *c* Cotyledons.

Propagation by buds. This takes place in several ways: by means of the bulbs which grow at the base of the scales in what is called a bulbous root; these bulbs are soon detached and become independent plants; by means of bulblets growing in the axil of leaves, as in some species of lily, or in the place of flowers, as in the tree onion; by means of buds growing at the margins of leaves, as in Bryophyllum (fig. 15); by means of buds or eyes in the subterranean stems of plants, as in the potato. All these resemble seeds in producing new plants, when placed in proper situations, but differ from them in not being the product of fecundation, but being extensions of the parent plant.

Propagation by layers or slips. The first of these is accomplished by surrounding a branch with moist earth, in which case it often throws out roots and becomes an independent plant, more especially if the bark be wounded, or a ligature be passed round it at the part placed in the earth. Sometimes this process takes place naturally, the branches bending over so as to touch the ground, and then throwing out roots at their point of contact, as in the Raspberry. Propagation by runners is somewhat analogous. That by slips is essentially the same as the foregoing, the only difference being that the branch or slip is wholly detached from the parent stem. There is one fact connected with this mode of propagation deserving of notice, that the number of seeds in the fruit produced by the new plant, is always less than in one arising from seed. Propagation by grafting and inoculating is somewhat analogous. This operation consists in uniting a part of one plant to another; this union is effected by the cambium, and hence it is requisite that the barks of the graft and stalk should be placed in apposition. The cambium exudes from each; becomes organized and produces a union. The operation of inoculating, or budding, is essentially the same, but in this case a bud and a slip of the environing bark only are used, and not a slip or cutting, as in grafting. In both cases they only succeed when the stalk, and the cutting or bud belong to the same natural family. A graft is merely an extension of the parent stem from which the scion was derived, and not a new individual.

Nutrition of Plants.

The essential constituents of plants are oxygen, hydrogen, and carbon; nitrogen, though not forming a component part of their tissues, is always present in growing organs, and is found in numerous products of vegetation. Various mineral substances also enter into the composition of different plants and their secretions. All these constituents must be introduced into the plant by absorption, without it be admitted that vegetables possess the power of transforming one simple substance into another, which, although asserted, has not been proved. The food of vegetables must always be taken in a fluid form, as the spongioles of the roots, the principal avenues by which it is introduced, can only absorb matters presented to them in a liquid state. The hydrogen contained in plants is principally derived from the decomposition of water, as this element does not exist in the soil in any appreciable quantity; but some is also derived from the atmosphere. Their oxygen is supplied from the same sources. Their carbon enters them in the form of carbonic acid, either through the roots, or is absorbed in a gaseous state by the leaves. Their nitrogen, which is always small in quantity, is derived from the atmosphere; a minute portion, perhaps, enters the plant in an uncombined state, but the larger part is introduced in the form of ammonia. The alkaline and earthy matters are furnished by the soil, from which each species takes up various materials in different proportions, according to its nature and wants.

It has been thought that the spongioles of roots have no power of selection, but absorb any thing presented to them in a liquid form, but this does not appear to be the case to the extent supposed; and it seems probable that these parts are endowed with a power of discrimination to a certain extent, and are capable of selecting the substances best fitted to promote the growth of the plant. It has been observed that roots excrete a peculiar matter, varying in different species of plants. This has been supposed to be injurious, or at least of no benefit to the plant, though it is nutritive to a vegetable of another kind. These suppositions do not appear to be supported by facts, and the attempt to explain the benefit of a rotation of crops by them, is erroneous. It has been satisfactorily shown, that the cause of sterility in a soil is owing to the absorption of all principles from it by the growing crop, and that if a supply of them be artificially kept up, that the same species of plants may be advantageously grown in the same spot, for an indefinite period.

The fluid absorbed by the roots is carried into the stem, probably undergoing some modification in its passage. It is now termed *sap*, and in its progress to the leaves, or its ascent, is still more altered by dissolving some of the soluble matters with which it comes in contact, and by undergoing certain chemical changes. In a newly developed herbaceous stem, the sap mainly ascends through the pith; but in woody exogenous stems, it rises through the alburnum, and in endogenous trunks through the whole wood. When it reaches the leaves, it is widely diffused through them, and undergoes its principal transformations. These are effected in the green cellular tissue, or that containing the coloured particles, called chromule; but all green parts of vegetables act on the sap, as the outer bark of herbaceous plants, &c. These changes do not take place when the direct action of light and air is withheld. They are a concentration of the sap; a decomposition of the carbonic acid contained in it, and of that absorbed by the leaves; the carbon and hydrogen being retained for the nourishment of the plant, whilst the oxygen is set free. During vegetation, leaves exhale much water; but the amount varies with the degree of warmth and dryness of the air, and the exposure to

light; the exhalation being very slight during the night. When the fluid thus escaping is greater than that absorbed by the roots, the leaves droop and wither; in general, however, these two functions of exhalation and absorption are in direct proportion to each other, and hence the sap ascends with a rapidity corresponding to the activity of the exhalation.

The immediate cause of this ascent has not been fully ascertained, and many theories have been devised to account for it; as the action of heat, capillary attraction, vital contractility of the vessels and cells, electric power and endosmosis; all these probably have their influence, though the latter process combined with capillary attraction and the exhalation from the leaves will explain most of the facts. When the sap is consumed in a proportion equivalent to the absorption of fluids, no accumulation of it, to any extent, can occur; but when the leaves fall off, the roots still absorb to a certain degree, and hence the stem becomes gorged with fluid; this gradually undergoes a change, and forms deposits in the cells and tubes of the wood. In the spring, also, absorption commencing before the formation of leaves permits a due exhalation, the trunk again is loaded with a superabundance of sap.

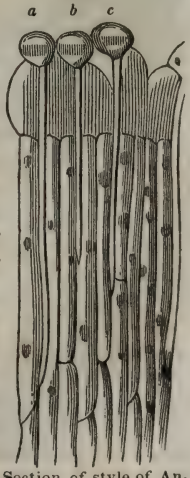
When the sap is thus concentrated by evaporation, and exposed to the action of the air in the tissues of the leaf, it undergoes certain changes, and forms new and peculiar products, when it is called the *proper juice*. This is collected by a system of vessels on the under surface of the leaves, which communicate with the bark; these are principally of the kind previously spoken of, as *vessels of the latex*. Hence the peculiar products of woody exogenous plants are found in the bark or wood, where they accumulate from year to year. In perennial herbs they are found in the root or subterranean modifications of the stem; whilst in annuals they are diffused through all parts of the plant.

The roots have hitherto been spoken of as the sole organs of absorption; but this process is likewise carried on by the leaves, and in some tribes of plants they are the principal organs of nutrition, as in the Cacti, and in many of the parasitic Orchideæ. This absorption of fluid by the leaves takes place mainly through the cuticle, and especially by means of the downy hairs which act like root fibres.

Fecundation of Plants.

In flowering plants, fecundation takes place by the action of the pollen of the anthers on the pistil. These minute cells or grains, when from any cause they come in contact with the stigma of the pistil, adhere to it by the glutinous secretion it exudes, and in a short time change in a remarkable manner; the outer coat of the pollen-cell opening and allowing the inner coat to protrude in the form of a tube of extreme tenuity, filled with the fluid and granular matter already spoken of; this passes between the cells of the stigma, and passes down through the loose texture of the style, until it reaches the ovary; whilst this is going on, a cavity or sac, called the *sac of the amnios*, filled with fluid, makes its appearance in the nucleus of the ovule; and the foramen being brought in contact with the placenta, or in orthotropous ovules, carried up to the summit of the cell, a pollen-tube enters the orifice and the granules thus reach the nucleus. What further occurs is not known, but it is ascertained that in a short time the embryo appears in the amniotic sac.

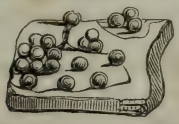
Fig. 33.



Section of style of Antirrhinum, showing the passage of pollen-tubes.

In the lowest orders of plants reproduction takes place by the developement of cells, which being set free by the bursting of the parent cell, enclosing

Fig. 34.

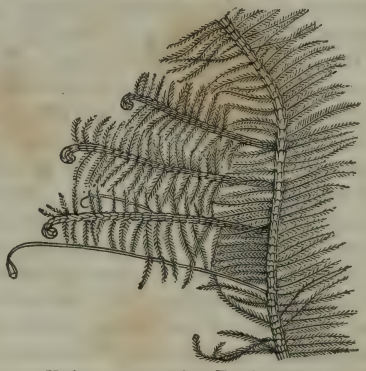


Protococcus nivalis, showing cells and vesicles, partly embedded in a slimy jelly.

Fig. 35.

Marchantia polymorpha.

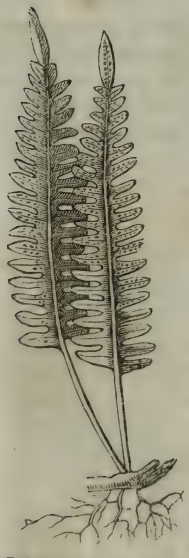
Fig. 36.



Hydnum castrensis. Feather moss.

them, become independent beings, capable of producing others in the same manner. In somewhat higher tribes, only a small portion of the cells of which they are formed, have this reproductive power, and they are always found in certain and definite parts of the plant; these cells are called *spores*, and this form of reproduction occurs in the sea weeds, lichens, and fungi, &c. In some of the liverworts there is a distinct set of organs of fructification. The little bodies forming radii on them are spore cases; these when mature, burst and scatter their contents or spores, which originate new plants, their outer coat rupturing, and the inner projecting in a long tube filled with new cells; these increase into a leafy projection, from the lower part of which, root fibres proceed.

Fig. 37.



Polypodium vulgare, or Wall Fern.

In mosses the organs of reproduction are more complex. There are small capsules or urns on long stalks, furnished with lids which fall off when the spores contained in them are mature; these spores are developed round a columella. After being scattered on the earth, the outer coat of these spores ruptures, and several minute tubes are projected, each of which contains granules, each capable of forming a new plant. In the ferns the spore cases are found on the backs or edges of the leaves, disposed in various forms, these cases are filled with a fine brown dust, which is scattered on their bursting. This dust is composed of spores which vegetate in a peculiar manner; at first the outer coat is ruptured, and the inner one projects in a long tube, within which, as well as in the original cavity, new cells are formed from the included germs. These cells at first coalesce and form

a foliated expansion, as in liverworts; in the centre of this a protuberance makes its appearance, which is finally prolonged above into a sort of stem, and below into a root; from this stem the true leaves are afterwards developed, when the primary one decays.

VEGETABLE CHEMISTRY.

It has already been stated that vegetables consist chiefly of carbon, oxygen, and hydrogen, with some nitrogen, especially in their products; to these are added minute portions of potash, soda, sulphur, silica, &c.; these, however, bear but a small proportion to the three first, which make up the greater part of all vegetables and their products. These ultimate principles are variously combined, and thus form certain compounds, some of which are common to all vegetable bodies, whilst others are peculiar to certain orders or genera. Those which are common, either contain nitrogen, or are devoid of that element. Those into which nitrogen enters as a component part, are, fibrin, albumen, legumin or casein, and the vegetable alkaloids, &c.

Fibrin. Is found in vegetable juices, and separates from them, when at rest, in the form of a slight coagulum. It is contained largely in gluten, or that substance remaining after wheat flour has been well washed with water. It is insoluble in that fluid, but when long boiled in it, is altered in composition. By the aid of heat it is partially soluble in acetic acid. It is dissolved by the alkalies, and when heated with them is decomposed, and gives out ammonia.

Albumen. Also found in vegetable fluids, and in the seeds and other parts of plants. It is present in two forms, either fluid or coagulated. All vegetable juices when heated, become turbid, from the albumen they contain becoming coagulated. Its properties and composition are nearly the same as those of fibrin.

Legumin or Casein. This is found in abundance in the seeds of the leguminosæ. It is not coagulated by heat, but readily so by the weak acids. The scum formed on the surface of water in which peas or beans are boiled, is principally composed of this substance. Its properties are similar to other articles of its class.

Vegetable Alkaloids. These substances are very remarkable, and may be considered as the most active class of vegetable principles. They all contain nitrogen, and, as a consequence, when subjected to a high temperature, give off ammonia, from the nitrogen uniting with a portion of the hydrogen. They restore a blue reddened by an acid, and usually have an extremely bitter taste. Most of them are solid and fixed, and when pure, are crystallizable; are usually soluble in alcohol, but sparingly so in water. They form salts with the acids, which are in most cases more soluble in water, than the bases from which they are made. In plants they usually exist in the state of a salt, being united to one or other of the vegetable acids.

Vegetable Neutral Principles. These may all be said to contain nitrogen; as it is probable that those in which this element does not exist, may be considered as belonging to extractive. They unite with acids, and form crystallizable compounds, but their solutions do not exhibit alkaline reactions, and the salts they form are acid. In some plants, a substance of this class occurs, called *amygdaline*, which is very interesting, from the fact that on its admixture with *emulsine* (a kind of albumen), a decomposition takes

place, and there is a formation of volatile oil of bitter almonds, hydrocyanic acid, &c.

Compounds not containing Nitrogen.

Many of these compounds have their oxygen and hydrogen in the same proportions as those of water, and most of them can be converted into sugar when boiled a long time with an acid or alkali. In others of them, their hydrogen or oxygen is in much greater proportion than in water.

Oxygen and Hydrogen in same proportions as Water.

Lignin. Is a fibrous substance, destitute of taste or smell, and when perfectly dry, not alterable by the action of the air, but when moist, becoming decomposed, furnishing carbonic acid and water. When boiled with sulphuric acid, it is changed into dextrine, and afterwards into sugar. It constitutes about 1-100th of dried wood. *Comp.* C^{12} H^{10} O^{10}.

Starch. Is contained in vegetable cells, in the form of granules, covered with an envelope not soluble in cold water. The granules vary much in size and appearance in different plants. It is changed by heat into dextrine, a soluble starch having the same composition; by boiling with dilute sulphuric acid, it is converted into sugar. It is coloured blue by free iodine, which is the best test for it. *Comp.* C^{12} H^{10} O^{10}.

Many kinds of starch are employed as dietetic articles, under the names of sago, tapioca, arrow-root, &c.; these, though possessing the same general properties, differ much in flavour, and in the form and appearance of their granules.

Wheat Starch, when pure, is white, and almost tasteless, and without odour. Under the microscope, it appears to consist of particles varying much in size, of which the largest and smallest are the most frequent, the intermediate ones being scarcer. Their shape is usually rounded, and their surface uneven. The hilum is surrounded by concentric rings, but is by no means evident, until a gentle heat is applied to the water in which the particles are suspended. Sometimes it is indicated by a line or rounded spot; the rings are traceable to the edge of the granule. When made to roll over in the fluid, they appear like oblate spheroids, one of the faces being rather more convex than the other.

Fig. 38.

Wheat Starch.
a A particle seen edgeways.

Arrow-Root, West Indian, is white, without taste or smell. When pressed between the fingers, it feels firm, and on being rubbed, produces a faint, crackling sound. Under the microscope it appears to consist of oblong, or ovate-oblong, or irregularly-shaped granules, having, occasionally, small mammillary points projecting from the surface, which are more evident after the particles have been in water for a short time. The rings are very delicate, and the hilum is circular, and has linear or stellate cracks. Procured from *Maranta arundinacea*.

Fig. 39.

West Indian Arrow-Root.

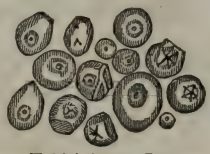
Arrow-Root, East Indian. A fine white powder. It looks like a finely powdered salt, it has not the firmness of the West Indian, nor like that, does it crackle on being rubbed between the fingers. Under the microscope it appears to consist of ovate or oblong-ovate, flattened granules, usually with a short neck or nipple-like projection. The hilum is at the small extremity; it is very small, circular and indistinct. The rings are numerous, closely set together and delicate. The product of *Curcuma angustifolia*, *&c.*

Fig. 40.

White East Indian Arrow-Root.

Arrow-Root, Tahiti. A fine white powder, often with a slight musty smell. Under the microscope it appears to consist of circular, mullar-shaped or polyhedral particles. The mullar-shaped particles are often narrowed at base, and seem to be hollowed out. The hilum is small and circular, and cracks in a linear or stellate manner. The rings are few and somewhat indistinct. Produced by *Tacca pinnatifida.*

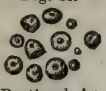
Fig. 41.



Tahiti Arrow-Root.

Arrow-Root, Portland. A white powder. Under the microscope the particles appear very minute. They are circular, mullar-shaped or polygonal. The hilum is circular, and seems to be at the bottom of a slight depression; it cracks in a linear or stellate manner. It is obtained from *Arum maculatum*, and is probably identical with the starch afforded by *A. triphyllum.*

Fig. 42.



Portland Arrow-Root.

Tous les mois, is an arrow-root with a satiny appearance, and looks more like potato starch than the above mentioned feculas. Under the microscope it is found to consist of larger particles than any other known starch. They are oval or oblong, usually more or less ovate. The hilum is circular, and usually at the smaller extremity; occasionally it is double. The rings are numerous, regular, and close set. They and the hilum are often cracked. It is procured from a species of *Canna.*

Fig. 43.

Tous les mois.

Potato Starch. A white powder. Under the microscope it appears to consist of particles of various shapes and sizes, the regular form probably being ovate; they have concentric rings on their surface. The hilum is circular, and is often double. The cracks observable in some of the particles usually commence at the hilum. The size of the particles is greater than those of the other feculas, with the exception of the last mentioned.

Potato Sago. An article is manufactured from potato starch in imitation of pearl sago, and is often sold for it. Under the microscope it is found that the particles of the artificial are larger than those of the true sago, and that they are more regularly oval and ovate, more distinctly annulated, smoother and less broken. When cracks occur at the hilum, they are usually in two diverging fissures.

Sago. There are two forms of sago; one pulverulent or sago flour, the

Fig. 44.

Potato Starch,
a Normal particle. *b* Irregular do. *c d* Particles with two hila. *e f g* Particles broken by pressure and water.

Fig. 45.

Potato Sago.

Fig. 46.

Sago.

other granulated, which is either white or brown. The first is whitish, with a somewhat reddish tint; it has a faint odour. Under the microscope it is found to consist of oval or ovate particles, many of which appear as if truncated, so as to be more or less mullar-shaped. They are usually more or less broken, and most of them have an irregular or tuberculated surface. The hilum, when perfect, is circular, and cracks either with a simple slit, or in a cruciform or stellate manner. The surface is annulated, but less distinct than in potato starch. The granular sago consists of the same kind of particles, but larger, more broken, and less regular in their form. Sago is obtained from several species of *Sagus*.

Tapioca. Is in small irregular lumps or grains, partially soluble in cold water. When examined under the microscope, they are found to consist of entire and broken particles; the first of which appear circular or mullar-shaped, with a distinct and marked hilum. Sometimes the mullar-formed ones have a contracted base; at others, instead of the flat end, there are two faces meeting at an obtuse angle. The hilum is surrounded by rings and cracks in a stellate form.

Fig. 47.

Tapioca.

Sugar. There are several kinds of sugar, some capable of undergoing fermentation, the others not. To the first class belong cane, grape, or starch sugar, and to the latter liquorice sugar, mannite, &c.

Cane Sugar. This is found principally in the sugar cane, but also exists in some quantity in the root of the beet, in the sap of the maple, &c. It crystallizes in oblique rhombic prisms, and requires one-third its weight of cold water to dissolve it. When acted on by dilute acids, it is converted into grape sugar. Its composition is C^{12} H^{11} O^{11}.

Grape Sugar. This exists in grapes, honey, figs, &c., and can also be obtained by the action of dilute sulphuric acid on starch, lignin, &c., and even by the same means from cane sugar. Much of it exists in molasses. It is less soluble than cane sugar. Its composition is C^{12} H^{14} O^{14}.

Mannite. Forms the greater portion of pure manna, and is also found in the celery and other plants. It is not capable of fermentation. Its composition is C^{6} H^{7} O^{6}.

Liquorice Sugar. This is very soluble in water, but cannot be made to crystallize; with acids it forms compounds which are very sparingly soluble. It is incapable of fermentation.

Gum. This substance exudes in a fluid form from many plants, and becomes hard by an evaporation of its watery particles. When pure, it is co-

lourless or straw-coloured, but is often tinged by some colouring principle of the plant; it is transparent and brittle, very soluble in water, forming mucilage, but insoluble in alcohol. It is principally obtained from different species of *Acacia*, but is plentiful in the plum, peach, and cherry. There are several kinds of gum, differing from each other in the relative proportions of *Arabine* or *Bassorine* they contain.

Mucilage is a modification of gum, differing from it in being precipitated by neutral acetate of lead. It abounds in the roots of many plants, as the mallow, &c.; in the leaves of others, as the benne; in the pith of some, as the sassafras; and in the testa of the seeds of others, as in flaxseed.

Pectin, or Pectic acid. Is a compound found in many vegetable juices. When moist, it forms a transparent jelly, tasteless and imperfectly insoluble in water; when dry, it is in the form of a translucent mass. To the presence of this substance, the consistence of fruit jellies is owing. Its composition is C^{42} H^{8} O^{10}.

Extractive. Under this name certain matters found in the juices of vegetables, and apparently similar in properties, have been designated. They are, however, almost always impure, being modified by other vegetable compounds. Many of what have been called the neutral principles of vegetables, belong to this class.

Hydrogen in greater excess than in Water.

Fixed Oils. These substances are very similar in composition to those obtained from the animal kingdom, and like them, are usually composed of oleine, stearine, and margarine. They are principally obtained by expression from the fruit, and are mostly combined with a certain portion of mucilage and colouring matter, and hence acquire different colours and flavours. When perfectly pure, they are colourless, and almost tasteless and odourless. Many of them are highly esteemed as remedial agents. Their consistence is various, from that of a thin fluid, to that of compact fat. Almost all of them contain a peculiar acid, or are capable of acidifying.

Volatile Oils. These are exceedingly numerous in the vegetable kingdom, and are not confined to any particular part of the plant, but may occur in all portions of them. They are characterized by possessing some strong and peculiar odour, and are obtained by distilling the plant with water. When perfectly pure, they are colourless, but in general, are coloured from the presence of some impurity. Their odour is powerful, and their taste pungent and burning. Many of them consist only of carbon and hydrogen, whilst others contain some oxygen, and some are also combined with sulphur. To the first of these belong oil of turpentine, whose formula is C^{5} H^{4}; to the second, camphor, C^{10} H^{5} O; to the third, oil of mustard, C^{32} H^{20} S^{5} O^{5}.

Resins and Balsams. Resins exude spontaneously from many trees, and are very various in composition. They are all insoluble in water, but soluble in alcohol. Balsams consist of resin, volatile oil, and sometimes contain benzoic acid. What are termed gum-resins, are composed of resin, volatile oil, and gum.

Caoutchouc. This substance when pure, is nearly white. It is softened, but not dissolved by boiling water, nor is it soluble in alcohol, but it is so by ether, naphtha, and some of the volatile oils. It is found in larger or smaller proportions in most plants having milky juices.

Oxygen in greater excess than in Water.

Vegetable Acids. These possess the usual properties of the mineral acids, being sour, reddening vegetable blues, and forming salts with bases. Some of them, however, have the power of uniting with more than one atom of base, and hence are called polybasic; by heat, they are frequently resolved into more simple acids. Some of them are very generally diffused through the vegetable kingdom, whilst others are confined to one or more orders. In general they contain no nitrogen.

CLASSIFICATION OF PLANTS.

Systematic Botany has been defined by Dr. Lindley, to be "the science of arranging plants in such a manner that their names may be ascertained, their affinities determined, their true place in a natural system fixed, their sensible properties judged of, and their whole history elucidated with certainty and accuracy." To accomplish this, all botanists, whatever might be their views as to the mode and order in which the members of the vegetable kingdom were to be arranged, have felt the necessity of separating them into groups, which they divide and subdivide in various ways, in accordance with their respective views. At the present day, the following divisions are universally adopted, though there is some difference of opinion as to the exact limits of some of them.

A *Species* includes all individuals which, although they may differ in unimportant particulars, are identical in their real characteristics, and produce, from their seeds, other plants wholly resembling the parent. When slight differences occur in these offspring, as a variance in the colour, &c.; they are called *varieties.*

A *Genus* is a group of closely-related species, agreeing more with each other in their characters than with plants of another group. When some of these are more closely allied together, than with others of the genus, they have been erected into a *sub-genus.*

An *Order*, or *Family*, is a group of nearly-connected genera, and where certain minor groups exist in it, they are said to constitute a *sub-order.* Some botanists are of opinion that it is advantageous to consider the different groups into which a sub-order may be divided, under the name of *Tribes*, which they again separate into *sub-tribes.*

A *Class*, is a group of orders having certain marked characters in common. This, in like manner with the other divisions, is separated into *sub-classes.*

An enumeration of the points of difference or distinguishing marks of any one of these groups, whether of higher or lower order, is denominated its *character.* Thus the character of a class points out only those important points of structure on which it is founded; that of orders, notices the general structure of the plants embraced in it, especially of their fruit and flowers; the generic character, the particular modifications of the ordinal character in a given genus; and lastly, the specific character gives those less important of form, colour, &c., which mark it as distinct from its kindred.

Two methods of arranging plants have been followed; one the *Artificial*, founded by Linnæus, and at one time almost universally followed by botanists; the other, the *Natural*, originally sketched out by Jussieu, and since improved and augmented by the researches of many eminent botanists. The first of these has no other merit, nor was any other proposed by its author, than that of furnishing a ready mode of ascertaining the name of a plant, its rela-

tionship being kept out of view, except that the species of a genus are kept together, even when they do not possess the artificial character of the order in which they are placed.

Artificial System.

As this system is still followed by many, and especially by those who are commencing the study of botany, and as most systematic works, until within a recent period, are arranged according to it, it is essential that it should be understood, and hence the following brief sketch of it has been introduced.

The classes and orders, it will be seen, are wholly founded on the number, position, and connexion of the stamens and pistils. The classes, which are twenty-four in number, are founded upon modifications of the stamens, and have names derived from the Greek, designating these modifications, as follows:

Number of Stamens.	1. *Monandria;* one stamen to each flower.
	2. *Diandria;* two stamens.
	3. *Triandria;* three stamens.
	4. *Tetrandria;* four stamens.
	5. *Pentandria;* five stamens.
	6. *Hexandria;* six stamens.
	7. *Heptandria;* seven stamens.
	8. *Octandria;* eight stamens.
	9. *Enneandria;* nine stamens.
	10. *Decandria;* ten stamens.
	11. *Dodecandria;* twelve to nineteen stamens.
Number and Position.	12. *Icosandria;* more than ten stamens, inserted on calyx; (usually twenty.)
	13. *Polyandria;* more than ten stamens; (usually more than twenty; variable.)
Number and relative Length.	14. *Didynamia;* four stamens, two longest. Flowers labiate.
	15. *Tetradynamia;* six stamens, four long, and two short. Flowers cruciform.
Connexion of Stamens by Filaments or Anthers.	16. *Monadelphia;* filaments united into a single set, tube, or column.
	17. *Diadelphia;* filaments united in two sets. Flowers papilionaceous.
	18. *Polyadelphia;* filaments united in more than three sets.
	19. *Syngenesia;* anthers united into a ring or tube. Flowers compound.
Position of Stamens as respects the Pistils.	20. *Gynandria;* stamens on the pistil or style.
	21. *Monœcia;* stamens and pistils in separate flowers, but on the same plant.
	22. *Diœcia;* stamens and pistils in separate flowers, and on different plants.
	23. *Polygamia;* stamens and pistils, in the same or separate flowers, on the same, or on different plants.
Invisible, or wanting.	24. *Cryptogamia;* stamens invisible or wanting.

The eleventh, eighteenth, and twenty-third classes have generally been omitted since the time of Linnæus, and the genera contained in them distributed among the other classes.

The orders in the first thirteen of these classes are founded on the number of styles, or where these are wanting, of the stigmas, and are:

Number of Styles or Stigmas.

1. *Monogynia;* one style to each flower.
2. *Digynia;* two styles.
3. *Trigynia;* three styles.
4. *Tetragynia;* four styles.
5. *Pentagynia;* five styles.
6. *Hexagynia;* six styles.
7. *Heptagynia;* seven styles.
8. *Octagynia;* eight styles.
9. *Enneagynia;* nine styles.
10. *Decagynia;* ten styles.
11. *Dodecagynia;* eleven or twelve styles.
12. *Polygynia;* more than twelve styles.

The orders of the fourteenth class are only two:

Seeds naked or covered.

Gymnospermia; having naked seeds.
Angiospermia; having the seeds covered or in a pericarp.

The orders of the fifteenth class are also two:

Form of fruit.

Siliculosa; fruit a silicle, or short pod.
Siliquosa; fruit a silique, or long pod.

The orders of the sixteenth to the eighteenth, and twentieth to twenty-second classes, are founded on the number of stamens, and bear the names of the first thirteen classes, as monandria, &c.

The orders of the nineteenth class are founded on the character of the flowers; they are:

Character of flowers.

Polygamia æqualis; flowers in heads, and all perfect.
Polygamia superflua; rays or marginal flowers, pistillate only.
Polygamia frustranea; marginal flowers neutral, the others perfect.
Polygamia necessaria; marginal flowers pistillate and fertile, disk flowers staminate and sterile.
Polygamia segregata; each flower with its proper involucre.
Monogamia; flowers solitary, but with united anthers.

The orders of the twenty-third class are founded on the characters of the two preceding classes.

Monœcia; unisexual and perfect flowers on the same plant.

Diœcia; the different flowers on different individuals.

Triœcia; perfect flowers on one plant, staminate on a second, and pistillate on a third plant.

The orders of the twenty-fourth class are natural, and therefore not to be defined by an artificial character. They are:

Filices; or Ferns.
Musci; or Mosses.
Algæ; or Lichens, Sea Weeds, &c.
Fungi; or Mushrooms, &c.

The method by which the name of a plant can be discovered is very simple. The student first examines it to ascertain to what class it belongs; this being accomplished, he next ascertains to what order it appertains; when this is satisfactorily done, by a reference to a botanical work or works, he will find that the order in question is probably subdivided into sections, and by comparing his plant with the characters of these subdivisions, he will find that it corresponds to one of them; by then examining it, in reference to the characters of the genera composing this subdivision, he will discover to what genus it belongs; and by a comparison of it with the description of the species of that genus he will finally identify it. This system, however, beautiful and simple as it is, has gradually been abandoned from its only being fitted for this identification of a species, and not at the same time conveying any information as regards the structure, natural alliances or properties of plants.

Natural System.

The great object proposed to be attained by a natural system of arranging plants, is to group together such species as most closely resemble each other, not in one point only, but in all important characters, and hence all points of resemblance or dissimilarity are allowed due weight. By pursuing this plan, it must be evident that the essential characters of the various groups, when fully detailed, actually show in what particulars the plants composing it agree among themselves, and differ from those of other groups. This plan being pursued from the highest classes down to the species, will enable the student not only to ascertain the name of an individual plant, but also will give him a tolerably correct idea of the structure, habits, and even, in many cases, sensible properties of the group to which it belongs. Although this is called a natural system, no one that has been proposed is truly so, for whilst they all express the natural affinities of plants in a greater or less degree, they are all artificial to a certain extent, as every classification of the objects of nature must be, which is devised by the finite mind of man.

Numerous systems have been proposed, founded on the peculiar views of the devisers of them. Some writers, as Jussieu, &c., commence their exposition with the lowest order, and gradually ascend to the highest; whilst others, as Decandolle, &c., begin with the most perfect, and conclude with the least organized. In the succeeding pages the system of Decandolle, with some slight modifications, has been adopted as that most generally known and followed.

The vegetable kingdom may be divided into two great series, the Flowering and the Flowerless plants, answering to the old divisions of *Phænogamia* and *Cryptogamia*. The flowerless series may naturally be separated into two classes. The first, or Acrogens, including those having a stem, or decided axis of growth, and usually furnished with leaves; their stems increase from the apex only, and scarcely at all in diameter. The second, or *Thallogens*, have no such division of parts, being stemless, leafless, and flowerless.

The flowering plants are also divisible into two classes, founded on distinct kinds of structure and growth. One the EXOGENS, increasing from the periphery; and the other the ENDOGENS, increasing from the interior. The embryo of the first having two cotyledons, it has also been called *Dicotyledonous*, and that of the second having but a single one, it has received the name of *Monocotyledonous*. These characters have already been spoken of, as well as the distinction between them in the venation of their leaves.

But there is a group of Exogenous plants, in which the ovules and seeds are naked, instead of being contained in an ovary or pericarp; there is also a group of spurious Exogens, which have the same peculiarity, and the two have therefore been formed into a separate class, under the name of GYMNOGENS or *Gymnospermous* (naked-seeded) plants.

A fourth class, containing a few but most extraordinary plants, appears to form a passage from the Endogens to the Thallogens. They are composed of cellular tissue, and bear flowers, and yet are propagated by spores and not by seeds. This class has received the name of SPOROGENS or *Rhizantheæ*, (root flowering).

The six classes of plants may be thus characterized:

Furnished with Flowers.

1. *Exogens* or *Dicotyledons*. Structure of stem exogenous. Seeds in a pericarp. Embryo with two cotyledons. Leaves reticulated.
2. *Gymnogens* or *Gymnosperms*. Seeds naked. Embryo with two or more cotyledons.
3. *Endogens* or *Monocotyledons*. Structure of stems endogenous. Seeds in a pericarp. Embryo with one cotyledon. Leaves parallel, veined.
4. *Sporogens* or *Rhizanths*. Structure mainly cellular. Pericarp containing spores instead of seeds. Embryo none.

Destitute of Flowers.

5. *Acrogens* having a regular stem growing from the apex, and clothed with leaves.
6. *Thallogens*. Stemless, rootless, and leafless.

These classes are of very different extent, as regards the number of species contained in them; the exogens having more than all the other flowering plants together; the endogens are also very rich in species, as are also both the acrogens and thallogens, whilst the two others possess but few.

Many divisions or sub-classes have been proposed in these classes, almost all of which are exceedingly artificial, but are convenient for practical purposes. Jussieu has split the exogens into three divisions founded on the presence, union, or absence of the petals; these have been generally adopted: they are:

Polypetalæ. Calyx and corolla both present, the latter having distinct petals.

Monopetalæ. Petals united.

Apetalæ. Petals wanting.

These divisions, as well as the other classes, have been variously subdivided by different authors, but it would be a useless task to attempt to notice

them; enough has been said to explain the plan to be carried out, and more fully elucidated, in the progress of the work.

Pharmaceutic Botany.

The relations existing between the medical properties of vegetables and their structure, have long attracted the notice of the learned, and it was early declared, that plants closely resembling each other in their external appearance, were possessed of analogous qualities. The first to promulgate this doctrine was Camerarius, according to Decandolle, and Cæsalpinus, according to Dierbach. Linnæus expressly says on this subject: "Plants that agree in genus, agree in quality; those of the same natural order have nearly similar properties; and those of the same natural class are somewhat similar in their powers." Decandolle and Lindley hold much the same sentiments, in which they are supported by numerous other and esteemed writers. That these opinions are correct to a great extent, must be admitted; but on the other hand, the exceptions are both numerous and important, for whilst in some orders there is found the most striking consonance between the external form and the remedial qualities of the species composing it, in others, it has been shown, that the most dissimilar properties occur. Thus, in the *Solanæ*, the fruit of *Capsicum* is pungent and stimulant, and that of *Atropa*, narcotic and poisonous. This dissimilarity extends even to genera, though less frequently. So, also, plants differing widely in their external appearance and structure, furnish products of analogous medical qualities. Thus, turpentines are furnished by trees of very distinct orders, and even classes, and manna is equally a secretion of a *Fraxinus* and a *Eucalyptus*.

It cannot be admitted, as is asserted by Lindley, that "a knowledge of one plant is a guide to the practitioner, which enables him to substitute with confidence, some other plant that is naturally allied to it." All, that in the present state of our knowledge can be conceded, is, that as a general rule, plants of the same order agree in their remedial qualities, though this is not universally the case.

Many attempts have been made to classify medicinal plants and their products, by their sensible properties; namely, their colour, taste, and odour, but none of these have been successful, as it has been found that in all cases, the exceptions are so numerous as to render such arrangements of little practical benefit. This has arisen not only from the difficulty of describing and defining sensations, but also from the fact that two or more articles having the same sensible property, may differ widely from each other in action on the system. Thus, for instance, morphia, quinia, and aloes, are all bitter, and yet the first is a powerful narcotic, the second an efficacious tonic, and the third an active purgative. The best examples of this method of arranging plants, are found in a paper by Dr. Osborne, (*Trans. Assoc. &c. King & Queen's College, V.*) and an Essay on the subject by Dr. Graves, (*Supp. Edin. Dispen.*)

Collection and Preservation of Plants.

Vegetables used as medicinal agents, should, as far as possible, be collected every year, and those previously obtained, rejected, as many vegetable substances are altered and deteriorated by keeping. A variety of circumstances exercise an influence on the activity of a plant, as the locality in which it

grows, the season of the year, and its dryness or wetness, its natural or cultivated state, &c. As a general rule, the time for collecting a vegetable substance depends on the part of it required for use.

Plants should never be gathered for medicinal purposes whilst very young, as their peculiar principles have not had time to become developed, and hence they are in most cases inert; thus the young shoots of the Poke, or of the Asclepias, are used as substitutes for Asparagus, and can be eaten with impunity, whilst at a later period, they are possessed of acrid and purgative powers. The influence of soil is very remarkable. Most of the Umbelliferæ growing in a dry soil are aromatic, whilst those peculiar to wet places, are narcotic and poisonous. The Cruciferæ thrive best in damp places, but the Labiatæ are principally found in dry situations. The same plant is much influenced by a difference of locality; thus it is stated, that Cinchona obtained from trees growing in low situations, is always of inferior quality, whilst the bark from the same species, but inhabiting a high and airy spot, is possessed in the fullest degree of those properties for which this article is esteemed.

Cultivation also exerts the greatest influence on the constitution of vegetables, and in almost every instance deteriorates their active, but increases their nutritive qualities. Thus, it is found that by cultivation, the dry and tasteless sarcocarp of many of the Pomaceæ and Drupaceæ, becomes pulpy and grateful to the palate, and the unpleasant and narcotic juices of the Celery, become bland, aromatic, and mucilaginous. Hence, as a general rule, plants should be collected where they naturally grow, as their active virtues are there most strongly developed. There is one striking exception to this, in the Labiatæ, their aromatic flavour being much enhanced by cultivation.

Roots. The roots of annual and biennial plants should be collected in the autumn; the first before the decay of their stem, and the latter on the disappearance of the leaves of the first year. Those of perennial vegetables are best collected in the winter, or early in the spring. All intended to be kept, must be carefully washed and dried; where the root is large and succulent, it must be cut into slices. The aromatic roots should not be scraped, as much of their odorous and active qualities reside in the epidermis.

Stems. These are either herbaceous or ligneous; the former are to be gathered after the formation of the leaves, and before the appearance of the flowers. The latter should be procured in the winter, as at this time the wood furnishes a greater quantity of extract.

Barks. They are to be collected at the season when they can be most easily separated from the wood. They should, in all cases, be procured before the flowers are produced, or after the reproductive process is terminated, as during the time the plant is elaborating the organs necessary to that function, all its powers are directed to that purpose, and other portions of its structure are deprived of their usual proportion of proper juices. Barks should not be taken from very young or very old plants; in the first case they have not attained their full powers, and in the second, they have lost them; and the quantity of soluble matter in them becomes diminished. The desiccation of stems and barks requires no remark.

Leaves are to be collected after the flowers are expanded, and before the seeds ripen. An important remark on the collection of the leaves of the biennial narcotic plants has been made by Mr. Houlton. He states that they do not attain to their full powers, until their second year, and that those of the first year's growth are mucilaginous and inert (*Jour. Roy. Inst.* i. 196). The drying of leaves must be so conducted as to preserve their natural colour, and therefore they should never be exposed to the direct action of the sun.

Mr. Battley, who has paid much attention to this subject, gives the following directions. "The leaves being in a high state of preservation, and entirely freed from the stalks, and as much as possible from external moisture, must be laid in thin layers in baskets of willow stripped of its bark, in a drying room, from which light is to be excluded. They should then be exposed to a temperature of not less than 130° to 140° F. for three or four hours, or until they begin to shrivel. They are then to be turned, in the same temperature, and the heat kept up for six or eight hours longer, when the operation is generally finished, which is known by the leaves crumbling without much difficulty in the hand. If the process has been in all its parts properly managed, the result will be, that the leaves retain a beautiful green colour, and also, in a high degree, the medical properties of the plant to which they belong." (*Lond. Med. Repos.* xiv. 429.) They are to be kept in proper vessels, and carefully excluded from light and moisture. If they are to be used in the form of powder, it is better to powder them as soon as they are properly dried, and to preserve the powder in well-closed opaque bottles.

Flowers. It is very difficult to dry flowers so as to keep both their colour and odour. Some are incapable of complete desiccation, without at the same time destroying their active qualities. Others may be dried with facility and without deterioration, in the manner directed for leaves. To preserve both flowers and leaves, the plan of compressing them, as practised by the Shakers, answers a very good purpose; by this mode many leaves and flowers are kept in a very efficient condition; but it is essential that they be deprived of moisture before they are subjected to the pressure, otherwise they become mouldy and deteriorated.

An excellent paper on the preservation of plants and their preparations will be found in the American Journal of Pharmacy, i. 268, by the late Mr. Duhamel, to which we would refer, as containing ample information on the subject.

BOTANICAL TERMINOLOGY.

Abnormal. A departure from the ordinary structure.
Abortive. Not arriving at perfection.
Abrupt Leaf. A pinnate leaf, with no terminal leaflet.
Abrupt Root. Where the end appears broken or bitten off.
Acaulescent. Stemless.
Acerose. Needle-formed.
Achenium. A one-celled carpel, with a dry, indehiscent pericarp.
Achlamydeous. Wanting floral envelopes.
Acine. A grain or globule of a compound fruit.
Acotyledonous. Without cotyledons.
Acrogens. Flowerless plants, with stems growing from the apex, and having leaves.
Aculeate. Armed with prickles.
Acuminate. Sharp-pointed.
Acute. Terminating in an angle; not rounded.
Adnate. Adherent; growing together.
Æstivation. The manner in which the floral envelopes are folded in the bud.
Aigret. A pappus or coma.
Albumen. The farinaceous, fleshy, or horny deposit around the embryo.
Albuminous. Furnished with albumen.
Alburnum. Sap wood.
Alternate. Placed oppositely, but at different heights.
Alveolate. Deeply pitted, like a honey-comb.
Ament. Catkin, a spike with scaly bracts crowded together on a rachis.
Amphitropous. Straight ovules, with the chalaza at one end, the apex at the other, and the hilum between.
Amplexicaul. Embracing the stem.
Anatropous. An inverted ovule.
Anastomosing. The joining of vessels and fibres, so as to form a network.
Ancipital. Two-edged.
Andrœcium. The staminate system of a flower.
Androgynous. See Monœcious.
Angular. Having angles.
Annual. Lasting one year.
Annulated. Ringed.
Anterior. The side of a flower next the leaf or bract from which it springs.
Anther. The case or cell containing the pollen.
Antheridium. Organ of fructification in mosses.
Anthocarpus. Collective or compound fruit.
Apetalous. A flower without petals.
Apex. The summit, or upper end.
Aphyllous. Without leaves.
Apophysis. A process from the base of the theca in mosses.
Apothecium. The shield in lichens containing the sporules.
Appendages. As thorns, tendrils, &c.
Appressed. Closely applied.
Approximate. Growing near.
Apterous. Without wings.
Aquatic. Belonging to the water.
Arachnoid. Having interwoven hairs, like a cobweb.
Arborescent. Becoming woody; tree-like.
Areolate. Divided into angular spaces.

Aril. An expansion of the placenta or funiculus round a seed.
Aristate. Bearded; awned.
Aromatic. Sweet-scented.
Articulated. Jointed.
Ascending. Rising or directed upwards.
Ascidium. A kind of hollow leaf.
Assurgent. Ascending obliquely.
Atropous. See Orthotropous.
Attenuated. Tapering gradually till it becomes slender.
Auriculate. Having ear-like processes.
Awl-shaped. Slender; becoming sharp and curved at apex.
Awn. A bristle-like appendage.
Awned. Furnished with awns.
Axil. The angle formed at the junction of a leaf or petiole, with the stem.
Axillary. Growing in an axil.

Baccate. Berry-like.
Banner. The upper petal of a papilionaceous flower.
Bark. The outer covering of vegetables.
Barren. Producing no perfect seed.
Bearded. Having tufts of hair.
Bell-shaped. Swelling at base, and with no tube.
Berry. A pulpy or fleshy indehiscent fruit.
Bicuspidate. Having two points, each with a sharp apex.
Biennial. Living during two years.
Biferous. Bearing twice a year.
Bifid. Divided into two, two-cleft.
Bifoliate. Two-leafed.
Bifoliolate. With two leaflets.
Bifurcate. Two-forked.
Bijugous. A pinnate leaf, with two pairs of leaves on each part.
Bilabiate. A corolla, with two lips or segments.
Bilamellate. Having two laminæ.
Bilocular. Two-celled.
Binate. Of two parts.
Bipartite. Divided into two parts.
Bipinnate. Doubly pinnate.
Bipinnatifid. Doubly pinnatifid.
Biternate. Doubly ternate.
Bivalve. Having two valves.
Blade. Lamina. Expansion of leaf.
Blunt. Obtuse, rounded.
Brachiate. Having opposite spreading branches.
Bract. Floral leaf.
Bractlet, Bracteole. A bract on a branch of inflorescence.
Branch. A division of a stem or root.
Bristles. Stiff hairs, either simple or curved.
Bud. The winter residence of a leaf or flower.
Bulb. A subterranean bud.
Bullate. Raised in blister-like elevations.

Caducous. Falling off early.
Cæspitose. Forming a tuft. Turfy.
Calcarate. Spurred.
Calyciform. Cup-like.
Calycine. Belonging to the calyx.
Calyculate. Having an outer calyx.
Calyptra. The cap or hood of the sporangia in mosses.
Calyx. The outer floral envelope.
Cambium. The soft layer between the bark and the wood.
Campanulate. Bell-shaped.
Campylotropous. A curved ovule.
Canaliculate. Channelled.
Canescent. Becoming white or hoary.
Capillary. Hair-like.
Capitate. In heads, head-shaped.
Capitulum. A head.
Caprification. Artificial fertilization of pistillate flowers.
Capsule. A dry and dehiscent pericarp, usually opening by valves.
Carinate. Keeled.
Carneous. Flesh-coloured, or fleshy.
Carpel. A simple pistil, or element of a compound pistil.
Carpophore. The central axis supporting the fruit in the umbelliferæ.
Cartilaginous. Hard and tough.
Caryophyllaceous. Like a pink, having five petals with long claws, all regular.
Caryopsis. A thin pericarp adhering to the seed so firmly as not to be detached.
Catkin. See Ament.
Caudate. Having a tail-like appendage.

Caudex. A stem, or trunk.
Caulescent. Having a stem.
Cauline. Attached to the stem.
Caulis. The stem, or trunk.
Cell. A hollow cavity. The cavity of an ovary or pericarp.
Cellular tissue. A tissue composed of small bladders or vesicles.
Cellular plants. Those composed of cellular tissue, always flowerless.
Centrifugal Inflorescence. The flowering of a cyme.
Centripetal Inflorescence. The flowering of a corymb.
Cernuous. Drooping or bending down.
Chaff. The thin covering of the seeds of grasses, &c. or the flower bracts in compound flowers.
Chalaza. The point of union of the coats and nucleus of a seed.
Chrorophylle. } The coloured paren-
Chromule. } chyma of leaves.
Cicatrix. The mark or scar left by a leaf when it falls off.
Ciliate. Edged with hairs, like eyelashes.
Circinate. Coiled or rolled into a ring.
Circumscissile. Cut round; opening transversely.
Circumscription. The general outline.
Cirrhous. Having tendrils.
Clasping. Where the base of a leaf partly surrounds the stem.
Class. The highest division of plants in a system.
Clavate. Club-shaped; larger at one end.
Claw. The lower narrow end of a petal, by which it is affixed.
Cleft. Partially split or divided.
Climbing. Ascending by means of tendrils, leaves, or spurious roots.
Coadunate. Having united bases.
Coarctate. Pressed together.
Coccus. A grain or carpel of a compound carpel.
Cochleate. Coiled spirally, like a snail-shell.
Coleorhiza. Sheath of radicle in endogens.
Coloured. Any hue except green.
Columella. A permanent axile placenta.
Columnar. Having the form of a column.
Coma. A tuft of hairs at the apex of a seed.
Commissure. The inner face of a mericarp; the joining of one part with another.
Common. That which sustains organs or parts similar to each other.
Comose. Having a coma.
Complete. Having both floral envelopes.
Complicate. Folded together.
Compound. A whole, formed of similar parts.
Compressed. Flattened laterally.
Conduplicate. Folded longitudinally on itself.
Cone. A collective fruit. See Strobile.
Confluent. Running together.
Conjugate. In pairs.
Connate. Growing together at base.
Connectivum. The prolongation of a filament supporting the lobes of an anther.
Connivent. Convergent.
Contorted. Twisted.
Convolute. Rolled up into a cylinder.
Cordate. Heart-shaped.
Coriaceous. Leathery or parchment-like.
Cormophytes. Stem-growing plants.
Cormus. An enlarged subterranean base of a stem; a solid bulb.
Corolla. The inner floral envelope.
Corrugated. Wrinkled.
Cortex. The bark.
Cortical. Having bark, or arising from the bark.
Corymb. An umbel-shaped raceme.
Corymbose. Bearing corymbs.
Costate. Ribbed.
Cotyledons. Seed leaves.
Cotyliform. A rotate corolla with an erect limb.
Creeping. Running along the surface, or just under the surface of the ground.
Cremocarp. The fruit of umbelliferous plants.
Crenate. Having rounded notches or teeth.

Crenulate. Finely crenate.
Crested or *Cristate.* Having an appendage like the comb of a cock.
Crown. The pappus or coma on seeds.
Cruciate or *Cruciform.* In the shape of a cross.
Cryptogamia. Flowerless plants.
Cucullate. Hooded.
Cucurbitaceous. Gourd or melon-like.
Culm. The stem of the graminæ.
Cuneiform. Wedge-shaped.
Cupule. A cup-shaped involucre of imbricated bracts, as the cup of the acorn.
Curled. Where the periphery of a leaf is too large for the disk, it becomes waved or curled.
Curvinerved. Leaf nerves arising from a prolongation of the petiole, instead of the base.
Cuspidate. With a sharp rigid point.
Cuticle. The epidermis or outer skin of a plant.
Cyathiform. Goblet-shaped.
Cylindric. A roll or shaft of equal diameter throughout.
Cyme. An umbel-like inflorescence, but the pedicels are variously subdivided.
Cymose. Being in cymes. Centrifugal.
Cymules. The floral whorls in the Labiatæ.

Deciduous. Falling off at a stated period.
Declinate. Turned to one side.
Decompound. Several times divided.
Decumbent. Lying on the ground.
Decurrent. When the margin of a leaf, &c., is prolonged down a petiole or stem.
Decussate. Crossed; in pairs alternately crossing.
Deflected. Bent back.
Dehiscence. Natural opening of capsules.
Deltoid. Having a triangular outline.
Demersed. Submerged; under water.
Dentate. Toothed.
Denticulate. With small teeth.
Depressed. Flattened from above.
Descending axis. The root.
Dextrine. A soluble form of starch.
Diadelphous. Having the filaments in two parcels.
Diandrous. Having two stamens.
Diastase. A product of germination in a seed.
Dichotomous. Successively forked.
Diclinous. When the stamens and pistils are in different flowers.
Dicoccous. Two grained, or with two cocci.
Dicotyledonous. Having two cotyledons.
Didymous. Twinned.
Didynamous. Belonging to didynamia.
Diffuse. Loosely spreading.
Digitate. Fingered; five leaves inserted in a spreading form, at the end of a petiole.
Digynous. Having two styles.
Dimidiate. Halved.
Dimerous. A whorl of two parts.
Diœcious. Having the stamens on one plant, and the pistils on another.
Discoid. Resembling a disk.
Disk. The whole surface of a leaf, or centre of compound flower.
Dissected. Deeply gashed.
Dissepiment. A partition.
Distant. Situated at a distance from; remote.
Distichous. In two opposite rows.
Distinct. Separate, reverse of connate or confluent.
Divaricate. Widely spreading.
Diverging. Spreading out.
Divided. Severed into two or more parts.
Dodecandrous. Having more than ten and less than twenty stamens.
Dolabriform. Axe-shaped.
Dorsal. Fixed to the back.
Dorsal suture. Outer suture of a carpel.
Dotted. Marked with dots.
Downy. Having short, soft hairs.
Drupe. A pericarp, with a hard nut or stone covered by a sarcocarp.
Drupaceous. Bearing drupes or drupe-like.
Ducts. Membranous vessels or tubes, which do not unroll spirally.
Dumose. Bushy.

Duplicate. Doubly.
Duramen. Heart wood.
Dwarf. Small, as compared to the other species.

Eared. Having lobe-like appendages.
Ebracteate. Destitute of bracts.
Ecalcarate. Destitute of a spur.
Echinate. Beset with prickles.
Effuse. Open, dilated at the end.
Eglandular. Glandless.
Elaters. Spiral threads in the thecæ of Liverworts.
Elliptical. Longer than wide, rounded at each end.
Elongated. Longer than usual.
Emarginate. Notched, but wider than deep.
Embryo. The future plant, contained in the seed.
Emersed. Raised out of the water.
Endocarp. The inner coat of a fruit.
Endogens. Monocotyledonous plants.
Endopleura. The proper coat of the nucleus.
Endorhizæ. Monocotyledonous plants.
Endostome. Orifice of the outer coat of nucleus.
Enneandrous. Having nine stamens.
Ensiform. Sword-shaped.
Entire. Having an uninterrupted margin.
Epicarp. The outer skin of a fruit.
Epidermis. Cuticle; outer skin.
Epigynous. Growing on apex of ovary.
Epiphytes. Plants growing on other plants.
Episperm. Testa; outer coat of seed.
Equitant. Opposite leaves infolding each other, so as to alternately overlap each other's edges.
Erect. Upright.
Erose. Unequally sinuate, as if gnawed.
Etiolated. Blanched.
Evergreens. Plants retaining their leaves the whole year.
Exalbuminous. Seed without albumen.
Exogens. Dicotyledonous plants.
Exorhizæ. Dicotyledonous plants.
Exotic. Plants belonging to a foreign country.
Exserted. Projecting; protruded.
Exstipulate. Destitute of stipules.
Extine. Outer coat of pollen grains.
Extrorse. Turned outwards.

Falcate. Scythe-shaped; bent to one side.
Fascicle. Inflorescence, like that of most grasses.
Fasciculated. In bundles or fascicles.
Feather. The plumose crown of seeds.
Fertile. Applied to pistillate flowers.
Fibre. Any thread-like part.
Fibrous. Composed of fibres.
Fiddle-shaped. Oblong, but contracted laterally.
Filament. That part of a stamen supporting the anther.
Filiform. Thread-like.
Fimbriate. Fringed.
Fissure. A cleft, or split.
Fistulous. Hollow, like a reed.
Flabelliform. Fan-shaped.
Flaccid. Lax, or limber.
Flagelliform. Whip-like.
Fleshy. Thick, and containing a firm pulp.
Flexible. Easily bent.
Flexuous. Bending in various directions.
Floral. Relating to a flower.
Floret. One flower of an aggregate, or compound.
Floriferous. Bearing flowers.
Flower. The stamens and pistils, and their envelopes.
Foliaceous. Leafy.
Foliation. The arrangement of an unopened leaf in the bud.
Foliole. A leaflet.
Follicle. A one-valved pericarp, dehiscing longitudinally.
Foramen. Small aperture in the coats of a seed.
Fornicated. Arched; vaulted.
Foveate. Honeycomb-like.
Fovilla. The fine dust in the pollen grains.
Free. Not attached or connected.
Frond. A peculiar leaf, belonging to cryptogamic plants and palms.
Frondose. Having or resembling fronds.

Fruit. The seed with its enclosing pericarp.
Frutescent. Woody, or becoming woody.
Fugacious. Soon disappearing, or escaping.
Fulcrum. Various appendages of plants.
Funiculus. Footstalk of the ovary or seed.
Funnel-shaped. A corolla with a tube, and the limb expanding gradually into a conical shape.
Furcate. Forked.
Furrowed. Marked with longitudinal channels.
Fusiform. Spindle-shaped; tapering above and below.

Galea. A helmet; the upper lip of a labiate corolla.
Gamopetalous. Monopetalous; having one petal.
Gamosepalous. Monosepalous; having one sepal.
Gape. The opening between the lips of a labiate or personate corolla.
Gelatinous. Resembling jelly.
Geminate. Paired, double.
Gemmiparous. Bearing buds in the axils.
Geniculate. Bent at a very obtuse angle.
Germ. The growing point of a bud; the ovary.
Germination. The swelling of a seed and the evolution of its embryo.
Gibbous. Swollen or enlarged at one side.
Glabrous. Smooth; destitute of pubescence.
Gland. A small collection of tissue producing a secretion.
Glandular. Furnished with glands.
Glaucous. Covered with a greenish-gray powder.
Globose. Globular; round like a ball.
Glomerate. Consisting of small heads.
Glomerule. Small heads forming a glume.
Glume. The scales or bracts surrounding the stamens and pistils in the grasses.
Gluten. A tenacious principle found in some seeds.
Glutinous. Furnished with a cohesive matter.
Granulate. In the form of grains.
Gymnosperms. Naked-seeded plants.
Gymnospermia. An order of Didynamia; having naked seeds.
Gynandrous. When stamens are seated on the pistil.
Gynobase. The supporting disk or axis of the ovary.
Gynæcium. The pistillate system of a flower.

Habitat. The natural place of growth of a plant.
Hairs. Hair-like appendages to plants.
Halbert-shaped. Hastate.
Hastate. Shaped like a halbert.
Head. Flowers collected in a rounded form.
Heart-shaped. Cordate.
Heart-wood. Duramen; the inner layers of a stem.
Helmet. The upper lip of a labiate flower.
Hemicarp. Half a cremocarp.
Heptandrous. Having seven stamens.
Heptagynous. Having seven styles.
Herb. Any plant not having a woody stem.
Herbaceous. Not woody.
Herbarium. A collection of dried plants.
Herperidium. An orange, or similar fruit.
Heterogamous. A compound flower, with the disk flowers perfect, and the rays ligulate and pistillate, or neutral.
Heterotropous. See Amphitropous.
Hexamerous. A whorl of six parts.
Hexandrous. Having six stamens.
Hexagynous. Having six styles.
Hilum. The scar or mark on a seed, left by detachment of the funiculus.
Hirsute. Clothed with coarse hairs.
Hispid. Bristly; beset with stiff hairs.
Hoary. Whitish; from a scaly mealiness.

Homotropous. Having the same direction as the body to which it is attached.
Hooked. Curved suddenly at the point.
Horizontal. Parallel to the horizon.
Hypocrateriform. Salver-shaped.
Hypogynous. Stamens arising from below the ovary.

Icosandrous. Having more than ten stamens inserted on the calyx.
Imbricated. Lying over each other with regularity.
Impari-pinnate. Unequally pinnate.
Imperfect. Wanting stamen or pistil.
Inæquivalve. Valves unequal.
Incised. Irregularly and sharply cut.
Inclined. Bent towards another body.
Included. Contained within another body.
Inconspicuous. Not apparent.
Incrassated. Being thickened.
Incumbent. Leaning upon; the radicle resting against the back of one cotyledon.
Incurved. Bent inwards.
Indefinite. Too numerous to be counted.
Indehiscent. Not opening naturally.
Indigenous. Being a native.
Induplicate. Having the edges bent or rolled inwards.
Indusium. Thin membranous covering, or scale to the thecæ in ferns.
Inferior. Towards the base or root.
Inflated. Enlarged, as if dilated by air.
Inflexed. Incurved.
Inflorescence. The mode in which flowers are arranged on a branch.
Infracted. Bent at so acute an angle as to appear broken.
Infundibuliform. Funnel-shaped.
Innate. When an anther is firmly attached to the apex of the filament.
Inodorous. Without smell.
Insertion. The point of attachment or union.
Interfoliaceous. Between the insertion of leaves.
Internode. The space between nodes or joints.
Interrupted. When organs of a different size or kind are interposed in a series.
Interval. A channel on the seeds of umbelliferous plants, between the ridges.
Intine. Inner coat of ovule.
Intrafoliaceous. Within a leaf.
Introduced. Not originally a native.
Introrse. Turned inwards.
Inverted. Where a part is in an opposite direction to that of other similar parts.
Involucel. A partial involucre, an involucre to pedicels.
Involucre. A whorl of bracts to an umbel or head.
Involute. Rolled inwards.

Juga. Pairs.

Keel. The lower petal of a papilionaceous corolla.
Kidney-shaped. Much hollowed at one side, and rounded at the ends; reniform.
Knot. A node or swelling joint.

Labellum. A peculiar-formed petal in orchideous flowers.
Labiate. Having lips.
Lacerated. Torn; cut into irregular segments.
Laciniated. Jagged; irregularly divided.
Lactescence. Milkiness.
Lacunose. Pitted.
Lacustrine. Peculiar to lakes.
Lamella. A thin plate.
Lamina. A broad plate or expansion.
Lanate. Woolly.
Lanceolate. Shaped like the head of a spear.
Latex. The proper juices of plants.
Laticiferous tissue. The series of vessels carrying the latex.
Leaf. The organs of transpiration and respiration in plants.
Leaflet. One of the small leaves of a compound one.
Leaf-stalk. Petiole.
Legume. A pod; a bivalve pericarp, dehiscing by both sutures.

Legumin. A vegetable principle analogous to the casein of milk.
Lenticular. Shaped like a lentil.
Liber. The innermost layer of bark.
Lignin. A vegetable principle found in woody fibre.
Ligule. An appendage shaped like a strap.
Ligulate. Strap-shaped; usually applied to one of the kinds of florets of compound flowers.
Liliaceous. Having a corolla like a lily.
Limb. The spreading part of the petal of a monopetalous corolla.
Linear. Narrow and long.
Lineate. Marked with lines.
Linguiform. Tongue-shaped.
Lobes. Rounded divisions.
Loculicidal. The dehiscence of the component carpels of a compound fruit, by the dorsal suture.
Lodiculæ. Small scales around the flower in the grasses.
Loment. A jointed legume.
Loose. Open; not compact.
Lunate. Crescent-shaped.
Lunulate. A diminutive of lunate.
Lurid. Of a dull, deathly hue.
Lyrate. Pinnatifid, having the upper segments largest.

Marcescent. Persistent, but withering.
Marginated. Where the margin is marked and distinct.
Margin. The circumference or edge.
Mealy. Covered with a white powder.
Medullary. Relating to the pith.
Membranaceous or *Membranous.* Of the texture of membrane.
Mericarp. Half a cremocarp, a fruit of an umbelliferous plant.
Micropyle. Foramen or scar of an ovule.
Midrib. The main rib of a leaf, extending from the base to the apex.
Mitriform. Having two terminal divisions, like a mitre.
Monadelphous. Stamens united in one set.
Monandrous. Having one stamen.
Moniliform. Necklace-shaped.
Monocarpous. Bearing but one fruit, or bearing but once.
Monochlamydeous. When calyx only is present.
Monocotyledonous. Having but one cotyledon.
Monœcious. Having stamens and pistils in different flowers, but on the same plant.
Monogynous. Having but one style.
Monopetalous. Where the corolla is of one piece.
Monophyllous. One-leafed.
Monosepalous. Calyx in one piece.
Monospermous. One-seeded.
Mucronate. Having a rounded end, tipped with a prickle.
Multifid. Many-cleft.
Muricate. Having short rigid excrescences.
Muticous or *Mutic.* Pointless; awnless.
Mutilated. Not produced in a perfect form.

Naked. Wanting a covering analogous to that of other species.
Napiform. Turnip-shaped.
Natant. Swimming; floating.
Navicular. Boat-shaped.
Neck. The crown of a root. The upper part of the tube of a corolla.
Nectary. The part of a flower secreting honey.
Needle-shaped. Linear, rigid, tapering to a point.
Nerved. Having rib-like fibres.
Netted. Having reticulated fibres.
Neutral. Having neither stamens nor pistils.
Node. A knot; the projection from which leaves arise.
Normal. Regular in structure.
Nucleus. Kernel; the substance of a seed or ovule.
Nut. A one-celled, and one-seeded fruit, arising from a two or more celled and seeded ovule.
Nutant. Nodding; partially drooping.

Obcordate. Reversed heart-shaped.
Oblique. Not symmetrical, one side as it were cut off obliquely.
Oblong. Much longer than broad.

Obovate. Ovate, with the narrowest portion at base.
Obsolete. When a part is obscure, and as if worn away.
Obtuse. Blunt, rounded.
Obvolute. Where one margin of a leaf in the bud is exterior, the other interior.
Ochrea. A cylindrical stipule.
Octandrous. Having eight stamens.
Octogynous. Having eight styles.
Offset. A lateral branch, terminated by a cluster of leaves, and capable of taking root.
Oleaginous. Oily, affording oil.
Operculum. The lid or covering of the theca in mosses.
Opposite. Being on the same level, and base to base.
Orbicular. Having a circular outline.
Orthotropous. Where an ovule is turned from its original direction.
Oval. Longer than broad, the sides curving regularly from end to end.
Ovary. The germ or base of the pistil. The young state of a pericarp.
Ovate. Egg-shaped.
Ovule. The incipient form of a seed; contained in an ovary.

Paleaceous. Chaffy.
Palea. A chaffy bract to a floret in some compound flowers.
Palmate. Divided so as to resemble the hand and fingers.
Panduriform. Fiddle-shaped.
Panicle. An irregularly-branched raceme.
Paniculate. Disposed in panicles.
Papilionaceous. Butterfly-shaped; a form of irregular polypetalous corolla.
Papillose. Pimpled; having fleshy protuberances.
Pappus. The seed-down in compound flowers.
Parasitic. Drawing support from another plant.
Parenchyma. Common cellular tissue in a soft state.
Parietal. Arising from the inner wall of an organ.
Parted. Divided almost to the base.
Partial. Particular, not general.
Partition. A dissepiment.
Pectinate. Divided like the teeth of a comb.
Pedate. Finely palmate, like the foot of a bird.
Pedicel. A partial or secondary flower-stalk.
Peduncle. A flower-stalk.
Peltate. Shield-like; having a stalk or support in the centre.
Pendulous. Hanging down.
Pentagynous. Having five styles.
Pentandrous. Having five stamens.
Pentamerous. A whorl of five parts.
Pepo. An indehiscent fleshy, or internally pulpy fruit, formed of three united carpels.
Perennial. Lasting from year to year.
Perfoliate. Where a stem perforates a leaf.
Perforate. Having holes or dots, as if pricked.
Perianth. Floral envelopes.
Pericarp. The fruit; seed-case.
Peridium. A spore-case.
Perigonium. A perianth.
Perigynium. A sac enclosing the ovary.
Perigynous. Inserted around the ovary.
Perisperm. The albumen.
Peristome. The fringed border of the theca in mosses.
Permanent. } Remaining for a long
Persistent. } time.
Personate. Masked; a form of a labiate flower.
Petal. The coloured leaf of a flower.
Petaloid. Resembling a petal.
Petiole. The footstalk of a leaf.
Petiolule. The footstalk of a leaflet.
Phanogamous or *Phanerogamous.* Having visible stamens and pistils.
Phyllodium. A leaf formed of a dilated petiole.
Pilose. Hairy; having slender hairs.
Pinnate. Winged; where leaflets are arranged on each side of a simple petiole.
Pinnatifid. Cut-winged; where the lamina on each side of a petiole is deeply cleft.

Pistillate. Having pistils only.
Pistil. The central organ of flowers composed of style, stigma, and ovary.
Pith. The central spongy substance in the centre of plants, composed of cellular tissue.
Placenta. The line or body to which the ovules are attached.
Plaited. Folded in regular layers.
Plicate. Folded like a fan.
Plumose. Resembling a feather; fringed with hairs.
Plumule. The incipient ascending axis.
Poculiform. Cup-shaped.
Pod. A pericarp of two valves; it may be a Legume or Silique.
Podosperm. Funiculus; footstalk of an ovary.
Pollen. The granules or dust contained in anthers.
Pollen Tube. A minute tube projected from a pollen grain.
Pollinia. Masses of pollen.
Polyadelphous. Having stamens united in more than two sets.
Polyandrous. Having many stamens attached to receptacle.
Polygamous. Having perfect, or staminate and pistillate flowers, or all these kinds.
Polygynous. Having many styles.
Polypetalous. Having many petals.
Polysepalous. Having many sepals.
Pome. A pulpy or juicy fruit, formed of a juicy or fleshy calyx; enclosing the carpels.
Præfoliation. Vernation; the arrangement of a leaf in a bud.
Præfloration. Æstivation; the arrangement of the floral envelopes in a bud.
Præmorse. As if bitten off.
Prickle. A sharp appendage of the bark not connected with the wood.
Primine. Outer coat of ovule.
Procumbent. Lying on the ground.
Proliferous. Where leaves or flowers arise from others.
Prostrate. Lying on the ground.
Protruded. Projecting out; exserted.
Pruinose. Covered with a frost-like meal.
Pubescent. Hairy; having hairs of any kind.
Pulverulent. Powdery.
Pulvinate. Cushion-like.
Punctate. Dotted.
Puncticulate. Having minute dots.
Putamen. A nutshell.
Pyriform. Pear-shaped.
Pyxidium. A capsule with a transverse dehiscence.

Quadrangular. Four-cornered.
Quinate. Arranged in fives.

Raceme. An inflorescence having the flowers supported on pedicels along a rachis.
Rachis. The axis of inflorescence; or the general petiole in pinnate leaves.
Radiate. Diverging from a common centre, furnished with rays.
Radical. Proceeding directly from the root.
Radicle. Secondary roots; rootlets.
Rameal. Belonging to the branches.
Ramose. Branched.
Raphe. The ridge, or part connecting the hilum and chalaza.
Raphides. Minute crystals in the cellular tissue.
Ray. The outer florets of a compound flower.
Receptacle. The base on which the parts of fructification are seated.
Reclined. Inclined downwards.
Recurved. Bent downwards.
Reflexed. Bent backwards.
Remote. Distant.
Reniform. Kidney-shaped.
Repand. Spread; having a curved or sinuous margin.
Replicate. Bent back on itself.
Replum. A persistent placenta, or margin in certain seeds.
Resupinate. Inverted.
Reticulate. Netted.
Retroflex. Bending in various directions.
Retrorse. Turned backwards.
Retuse. When an apex is slightly indented or hollowed out.
Reversed. Bent back towards the base.

Revolute. Rolled backwards.
Rhizome. A horizontal subterranean stem.
Rhomboidal. Oval, but somewhat angular at the middle.
Ribbed. Where the midrib of a leaf sends off marked lateral ones.
Rigid. Stiff; inflexible.
Rimose. Full of chinks or clefts.
Ringent. Grinning; applied to a form of labiate flowers.
Root. The descending axis of a plant.
Rootlet. A secondary root or fibre.
Rosaceous. Having a corolla like a rose.
Rostrate. Beaked.
Rostellate. With a small beak.
Rotate. Wheel-shaped.
Rugged. Covered with small asperities.
Rugose. Wrinkled; having small folds or elevations.
Ruminated. When the albumen has a wrinkled or folded appearance.
Runcinated. Pinnatifid, with the divisions pointing backwards.
Runner. A shoot producing leaves and roots at the end.

Saccate. Having or resembling a small sac.
Sagittate. Arrow-headed.
Salver-shaped. A monopetalous corolla, with a flat spreading limb.
Samara. An indehiscent, winged pericarp.
Sap. The watery fluid absorbed by the spongioles of a plant, and affording it nourishment.
Sapwood. Alburnum; the outer layer.
Sarcocarp. The fleshy or pulpy coat of a pericarp, between the epicarp and exocarp.
Sarmentose. A running shoot, rooting at its joints.
Scabrous. Rough.
Scales. Thin membranous processes, attached to the cuticle, &c.
Scape. A radical peduncle, or flower stem.
Scarious. Dry and membranous.
Scorpoid. A unilateral raceme, which is revolute before expansion.
Scrobiculate. Pitted.
Secund. Turned to one side; one-sided.
Secundine. The second coat of the ovule.
Seed. The matured result of fecundation, and designed to reproduce the species.
Segments. The parts into which a corolla, calyx, &c., are divided.
Sepals. The leaves of a calyx.
Septicidal. When a pericarp opens by the opening of the ventral sutures, and a division of the dissepiments.
Septifragal. When the dissepiments remain attached to the axis, separated from the valves, as in the loculicidal dehiscence.
Septum. A partition.
Sericeous. Silky; covered with soft short hairs.
Serrate. Having teeth like those of a saw.
Serrulate. When serrate teeth are again serrated; it also means finely serrate.
Sessile. Where any organ is destitute of a stalk or support.
Seta. A bristle.
Setose. Bristly; having bristles or stiff hair.
Sheath. The prolongation of a leaf, bract, &c., down a stem, so as to enclose it.
Sheathing. Surrounding by a convolute base.
Shield-shaped. Shaped like an ancient shield.
Shrub. A small plant with a woody stem.
Sickle-formed. Much curved, with sharp edge.
Silicle. The pod of a plant of the order Siliculosa.
Siliculosa. An order of Tetradynamia, having pods almost as broad as long.
Silique. The pod of a plant of the order Siliquosa.
Siliquosa. An order of Tetradynamia, having the pods much longer than broad.
Silky. Covered with shining appressed hairs.

Simple. Undivided.
Sinuate. Having rounded shallow incisions.
Sinus. A rounded incision in the margin.
Smooth. Having an even surface.
Sorus. A cluster of sporangia in ferns.
Spadix. An elongated spike, covered by a spathe or modified bract.
Sparse. Scattered.
Spathe. A kind of sheathing bract, covering a spadix or single flower.
Spatulate. Oblong or obovate, with the lower end much narrowed.
Species. The lowest division of plants.
Sphacelated. Withering; becoming blackened.
Spermoderm. Testa, outer coat of seed.
Spike. Florets arranged on an elongated rachis, with no or very short pedicels.
Spikelet. A division of a spike.
Spindle-shaped. Fusiform.
Spine. A thorn; connected with the wood.
Spinose. Thorny.
Spiral vessels. Membranous tubes, having internally a spiral fibre or fibres.
Spongioles. The extremities of root fibres.
Sporangium. The case containing spores.
Spores. The organs serving as seeds in Cryptogamous plants.
Sporidia. Membranous cases containing spores in the fungi.
Sporogens. Parasitic plants, having flowers, but propagated by spores.
Sporules. The spores of lichens.
Spur. A process from the calyx or corolla, resembling a cock's spur.
Squamose. Scaly.
Squamulæ. Small scales, serving as perianth in the grasses.
Squarrose. Ragged; scales or leaves standing out from a common axis.
Stamens. The fecundating organs of plants.
Staminate. Having stamens only.
Standard. The upper petal of a papilionaceous flower; banner.
Stellate. Spreading out in a radiate manner.
Stem. The ascending axis of a plan
Stemless. Unprovided with a stem.
Sterile. A staminate flower.
Stigma. The terminating organ on a pistil, receiving pollen from the stamens.
Stipe. The stalk of a fern, or of a fungus, &c.
Stipellate. Having stipelles.
Stipelle. A stipule of a leaflet.
Stipitate. Having a stipe.
Stipulate. Furnished with stipules.
Stipule. A leafy appendage or leaflet, at or near the insertion of a petiole.
Stolon. A rooting branch or shoot.
Stomata. Pores in the epidermis.
Striate. Marked with longitudinal lines.
Strigose. Clothed with short, rigid, appressed hairs.
Strobile. A kind of ament with woody scales; each of which is an open carpel; a cone.
Strophiole. An appendage at the hilum.
Style. That part of a pistil between the ovary and stigma; it is often wanting.
Stylopodium. An epigynous disk bearing the styles.
Suberose. Cork-like.
Submersed. Under water.
Subterraneous. Growing beneath the earth.
Subulate. Awl-shaped; tapering to a sharp point.
Succulent. Juicy; pulpy.
Sucker. A shoot by which a plant may be propagated.
Suffruticose. Smaller than a shrub.
Sulcate. Grooved; marked with deep lines.
Superior. A calyx or corolla is superior when it is inserted on the upper part of an ovary.
Surculose. Producing suckers.
Suspended. An ovule hanging directly downwards.
Suture. A seam at the meeting of two parts; the line of dehiscence in a carpel.

Symmetrical. When parts are in their normal proportions.
Syncarpous. Several carpels uniting in one ovary.
Syngenesious. Anthers united in a tube.

Tail. A filiform process affixed to a seed.
Tap root. A conical root.
Tegmen. The inner covering of a seed.
Tendril. An appendage by which a climbing plant supports itself.
Terete. Columnar and tapering.
Terminal. Proceeding from, or borne on the summit.
Ternate. In threes; threefold.
Testa. The outer coat of a seed.
Tetradynamous. Having six stamens, four of which are longer than the others.
Tetragynous. Having four styles.
Tetramerous. A whorl of four parts.
Tetrandria. Having four stamens.
Thallogens. Stemless, leafless, flowerless plants.
Thallus. The frond in Hepaticæ.
Theca. The capsules or spore-cases in Acrogens.
Thorn. A spine or short process from the woody part of a plant.
Throat. The orifice of a calyx tube.
Thyrsus. A condensed panicle.
Tomentose. Covered with fine dense coat of wool or down.
Toothed. Having salient points not directed to the apex of the leaf, &c.
Tortuous. Irregularly bent or twisted.
Torus. A receptacle; properly a fleshy one.
Transverse. Crosswise.
Tree. A large woody plant.
Triadelphous. Having stamens in three sets.
Triandrous. Having three stamens.
Tribracteate. With three bracts.
Trichotomous. Three-forked.
Tricoccous. Having three cocci.
Tridentate. Three-toothed.
Trifid. Three-cleft.
Trifoliolate. Having three folioles.
Trigynous. Having three styles.
Trimerous. A whorl of three parts.
Tripinnate. Three times pinnate.
Tripinnatifid. A leaf with tertiary divisions.
Triternate. Three times ternate.
Truncate. As if cut off at the end.
Tube. The hollow cylinder of a monopetalous corolla.
Tuber. Thick and fleshy roots, of no regular form.
Tubercles. Small knobs or tubers.
Tuberculate. Warty.
Tunicated. Coated.
Turbinate. Top-shaped or inversely conical.
Turgid. Swollen; thick.
Turion. An immature scaly shoot.
Twining. Ascending spirally.
Two-edged. Compressed with sharp edges.
Two-ranked. Rows on opposite sides.

Umbel. An inflorescence, where the flower-stalks diverge from the same point in a radiated manner.
Umbellate. Bearing umbels.
Umbilicate. Having a depression at one or both ends.
Unarmed. Destitute of thorns or prickles.
Uncinate. Hooked.
Under-shrubs. Small plants with woody stems.
Undulate. Wavy.
Unguis. The claw of a petal.
Unguiculate. Claw-like; having a claw.
Unilateral. One-sided.
Urceolate. Dilated like the body of a pitcher.
Utricle. A small bag or sac; a caryopsis which does not adhere to the seed.

Valvate. Having valves.
Valves. The pieces of a pericarp, which separate naturally on ripening.
Variety. A plant differing from the type of the species in minor particulars.
Vascular plants. Plants with spiral vessels.
Vaulted. Arched, as the upper lip in some labiate plants.

Veins. The ribs of leaves.
Velvety. Clothed with a close, soft, and dense pubescence.
Venation. Distribution of veins in a leaf.
Ventral suture. The suture looking to the axis of the flower.
Ventricose. Inflated; swelling out.
Vernation. The arrangement of leaves in buds.
Verrucose. Warty.
Versatile. Lying horizontally, and moving freely on a point.
Vertical. At right angles with the earth.
Verticel. A whorl.
Verticillaster. A whorled cyme.
Verticillate. In whorls; bearing whorls.
Vesicular. Bladdery; having bladder-like cavities.
Vexillum. Banner of a papilionaceous flower.
Villous. Having a covering of shaggy hairs.
Virgate. Wand-like.
Viscid. Clammy, glutinous.
Vittæ. Canals filled with volatile oil on the commissure and in the intervals of the seeds of the umbelliferæ.
Voluble. Twining.

Wedge-shaped. Cuneiform; obovate, with straightish sides.
Whorl. Flowers or leaves surrounding the stem in numbers.
Wings. Lateral appendages to leaves, &c.; also the two side petals in a papilionaceous flower.
Withering. Shrivelling or decaying; marcescent.
Wood. The solid part of plants, composed of cellular tissue, woody fibre, spiral vessels, &c.

MEDICAL BOTANY.

A BOTANICAL DESCRIPTION OF PLANTS USED IN MEDICINE.

CONSPECTUS OF NATURAL ORDERS CONTAINING MEDICINAL PLANTS.

Series I.—Phænogamous or Flowering Plants.

Plants furnished with flowers and producing seeds. Structure of the stem exogynous. Embryo with two or more cotyledons. Leaves usually netted-veined.

Class I.—Exogens or Dicotyledonous Plants.

Stem with a distinct pith and bark, between which are layers of woody fibre and vessels; the increase in size by the deposition of new layers beneath the bark, forming concentric zones and traversed by rays. Leaves usually articulated with the branches, and having diverging and reticulated veins. Seeds in a pericarp. Embryo with two cotyledons.

Sub-Class I.—Polypetalous Exogenous Plants.

Floral envelopes, consisting of both calyx and corolla; the petals being distinct.

Group I.—Polycarpicales.

Ovaries several or numerous, distinct; when in several rows sometimes coherent, but not united into a compound pistil. Stamens and petals inserted on the receptacle.

Order 1.—Ranunculaceæ.—Carpels distinct. Stipules 0. Corolla imbricated. Albumen homogeneous. Seeds exarillate.

Order 2.—Magnoliaceæ.—Carpels distinct. Stipules large; convolute. Corolla imbricated. Albumen homogeneous.

Order 3.—Anonaceæ.—Carpels distinct. Stipules 0. Corolla valvate. Albumen ruminate.

Group II.—Menispermales.

Ovaries several, disunited. Flowers diclinous. Stamens few or definite. Pistils few or solitary. Embryo surrounded by an abundant albumen.

Order 4.—Menispermaceæ.—Albumen sparing, solid. Seeds amphitropous. Embryo large.

Order 5.—Myristicaceæ.—Albumen copious, ruminated. Sepals united into a valvate cup.

Group III.—Berberales.

Flowers unsymmetrical in the ovary. Placentæ sutural, parietal or axile. Stamens definite. Embryo enclosed in a large quantity of fleshy albumen.

Order 6.—Berbericaceæ.—Flowers regular, symmetrical. Placentæ sutural. Stamens opposite the petals. Anthers usually with recurved valves.

Order 7.—Fumariaceæ.—Flowers unsymmetrical and irregular. Placentæ parietal. Stamens opposite the petals.

Group IV.—Nymphales.

Ovaries several; either distinct or united into a compound pistil. Stamens indefinite, inserted on the receptacle. Embryo on the outside of a large quantity of albumen, or if the latter be wanting, seeds with a large plumule.

Order 8.—Nymphæaceæ.—Carpels united into a many-celled fruit, with dissepimental placenta.

Group V.—Papaverales.

Ovary compound, parietal placentæ. Calyx free from the ovary. Stamens and petals inserted on the receptacle. Sepals deciduous. Styles or stigma united.

Order 9.—Papaveraceæ.—Carpels consolidated. Calyx deciduous. Placentæ usually parietal.

Group VI.—Cruciferales.

Ovary compound with parietal or sutural placentæ. Embryo spiral or curved, with little or no albumen.

Order 10.—Brassicaceæ.—Stamens tetradynamous. Flowers tetramerous. Seeds exalbuminous.

Order 11.—Capparidáceæ.—Stamens not tetradynamous. Flowers tetramerous. Seeds exalbuminous. Fruit closed.

Order 12.—Resedaceæ.—Stamens not tetradynamous, definite. Flowers not tetramerous. Seeds exalbuminous. Fruit usually open at tip.

Order 13.—Cistaceæ.—Stamens generally indefinite. Flowers tri or quinquepetalous. Seeds with albumen. Fruit closed.

Group VII.—Violales.

Ovary compound with parietal or sutural placentæ. Calyx free from the ovary. Embryo straight, with little or no albumen.

Order 14.—Violaceæ.—Flowers polypetalous. Calyx many-leaved. Petals hypogynous. Stamens all perfect; anthers crested and turned inwards. Fruit consolidated. Seeds albuminous.

Order 15.—Flacourtiaceæ.—Flowers scattered, mostly polypetalous. Petals and stamens hypogynous. Leaves dotless, or with round ones only.

Order 16.—Passifloraceæ.—Flowers polypetalous or apetalous, coroneted. Petals perigynous, imbricated. Stamens on the stalk of the ovary. Styles simple, terminal. Seed arillate. Leaves stipulate.

Order 17.—Samydaceæ.—Flowers scattered, apetalous, tubular, hermaphrodite. Leaves dotted. Stamens perigynous.

Group VIII.—Guttiferales.

Ovary compound, with two or more cells, and the placentæ axile. Calyx free, imbricated. Corolla imbricated or twisted. Stamens indefinite, usually monadelphous or polyadelphous. Embryo with little or no albumen.

Order 18.—Dipteraceæ.—Leaves simple, with large convolute stipules. Flowers symmetrical. Petals equilateral. Calyx unequal, permanent, winged. Anthers beaked. Fruit one-celled, one-seeded.

Order 19.—Ternströmiaceæ.—Leaves simple, alternate, no stipules or very small ones. Flowers symmetrical. Petals equilateral. Anthers versatile. Seeds few or single. Stigmas on a long style.

Order 20.—Clusiaceæ.—Leaves simple, opposite, exstipulate. Flowers symmetrical. Petals equilateral. Anthers adnate, beakless. Seeds few or single. Stigmas sessile, radiating.

Order 21.—Hypericaceæ.—Petals oblique, glandular. Seeds numerous, naked. Styles long, distinct.

Group IX.—Silenales.

Ovary compound, one-celled, with a free central placenta. Calyx free or nearly so. Embryo coiled round a little mealy albumen, and more than one carpel combined into a compound fruit.

Order 22.—Caryophyllaceæ.—Calyx and corolla usually present, symmetrical. Ovules amphitropal. Leaves opposite, exstipulate.

Group X.—Malvales.

Ovary compound and many-celled, with the placentæ axile. Calyx free, with a valvate æstivation. Corolla imbricated or twisted. Stamens indefinite, monadelphous, or polyadelphous. Embryo with little or no albumen.

Order 23.—Sterculiaceæ.—Stamens columnar, all perfect. Anthers 2-celled, turned outwards.

Order 24.—Byttneraceæ.—Stamens monadelphous, usually sterile. Anthers 2-celled, turned inwards.

Order 25.—Malvaceæ.—Stamens columnar, all perfect. Anthers 1-celled, turned inwards.

Group XI.—Aurantiacales.

Ovary compound, with two or more cells, and the placentæ axile. Calyx free, imbricate in æstivation. Stamens indefinite, or twice as many as the petals, mostly monadelphous. Embryo with little albumen.

Order 26.—Aurantiaceæ.—Fruit consolidated, succulent, indehiscent. Petals imbricated. Stamens free, or nearly so. Leaves dotted.

Order 27.—Amyridaceæ.—Fruit consolidated, dry, hard, somewhat valvular. Petals valvate. Stamens free. Leaves usually dotted.

Order 28.—Cedrelaceæ.—Fruit consolidated, valvular. Stamens monadelphous or free. Seeds numerous-winged.

Order 29.—Meliaceæ.—Fruit consolidated, berried, or capsular. Stamens monadelphous. Seeds few, not winged. Leaves not dotted.

Group XII.—Rutales.

Ovary compound, with two or more cells; or carpels several, and more or

less united by their styles. Calyx free. Petals as many as sepals, or rarely wanting. Stamens as many or twice as many as sepals, distinct. Flowers often diclinous or polygamous.

Order 30.—Anacardiaceæ.—Fruit apocarpous. Ovule single, suspended by a cord rising from the base of the carpel.

Order 31.—Rutaceæ.—Fruit finally apocarpous, few-seeded, with the pericarp separating into two layers. Flowers bisexual.

Order 32.—Xanthoxylaceæ.—Fruit finally apocarpous, few-seeded, with the pericarp separating into two layers. Flowers bisexual or diclinous.

Order 33.—Simarubaceæ.—Fruit finally apocarpous, one-seeded, with the pericarp not laminated, and a small dry torus. Exalbuminous. Leaves alternate, exstipulate.

Order 34.—Zygophyllaceæ.—Fruit finally apocarpous, few-seeded; pericarp not laminated, and a small dry torus. Albuminous. Leaves opposite, stipulate.

Group XIII.—Geraniales.

Ovary compound, or of several carpels adhering to a central axis. Calyx free, usually imbricated. Stamens definite, usually monadelphous at base. Flowers regular or irregular.

Order 35.—Linaceæ.—Flowers symmetrical. Styles distinct. Carpels longer than the torus. Seeds with little or no albumen.

Order 36.—Oxalidaceæ.—Flowers symmetrical. Styles distinct. Carpels longer than the torus. Seeds with albumen.

Order 37.—Geraniaceæ.—Flowers usually symmetrical. Styles and carpels combined round a long-beaked torus.

Group XIV.—Sapindales.

Ovary compound, 2-3-lobed, 2-3-celled, with the placentæ axile. Calyx free, imbricated. Stamens definite. Petals irregular. Albumen wanting, or in small quantity.

Order 38.—Sapindaceæ.—Flowers complete, unsymmetrical. Petals usually with an appendage, or 0. Anthers opening longitudinally. Carpels 3. Seeds wingless, arillate.

Order 39.—Erythroxylaceæ.—Flowers complete, partially symmetrical. Calyx imbricated. Petals with an appendage. Ovules sessile, pendulous. Stigmas capitate. Embryo straight.

Group XV.—Rhamnales.

Ovary compound; 2-6-celled. Calyx free or adherent to base of ovary. Petals and stamens equal to lobes of calyx, and opposite to each other, or alternate.

Order 40.—Rhamnaceæ.—Flowers polypetalous. Calyx valvate. Seeds erect.

Order 41.—Celastraceæ.—Flowers polypetalous. Calyx imbricated. Stamens five, distinct.

Order 42.—Vitaceæ.—Flowers regular, symmetrical. Placentæ axile. Anthers opening longitudinally.

Group XVI.—Polygalales.

Ovary compound, 2-celled. Calyx free. Sepals and petals irregular. Stamens monadelphous; the tube of filaments open on one side, and more or less united with the claws of the petals. Seeds albuminous.

Order 43.—Polygalaceæ.—Flowers unsymmetrical. Petals naked. Anthers one-celled, opening by pores. Seeds carunculate.

Group XVII.—Leguminales.

Ovary simple or solitary. Calyx free; fruit a legume. Corolla papilionaceous or regular. Stamens diadelphous, monadelphous or distinct. Seeds exalbuminous.

Order 44.—Fabaceæ.—Flowers polypetalous, (or apetalous.) Carpel solitary, with the style proceeding from the apex of the ovary.

Group XVIII. Rosales.

Ovaries one or many, simple and distinct, or forming a compound ovary, with two or more cells and the placentæ axile. Petals and stamens inserted on the calyx. Seeds exalbuminous.

Order 45.—Rosaceæ.—Flowers polypetalous. Carpels free from the calyx, and quite or almost so from each other.

Order 46.—Drupaceæ.—Flowers polypetalous, regular, drupaceous. Carpel solitary, with the style proceeding from the apex of the ovary.

Order 47.—Pomaceæ.—Flowers polypetalous, regular. Carpels adhering to the calyx by their back.

Group XIX.—Myrtales.

Ovary compound, with two or more cells, placenta axile. Stamens definite or indefinite. Calyx free or adherent. Embryo with little or no albumen.

Order 48.—Myrtaceæ.—Ovary with more than one cell. Flowers polypetalous or apetalous. Calyx imbricated. Stamens indefinite. Anthers oblong. Leaves usually dotted.

Order 49.—Lythraceæ.—Calyx free, tubular, permanent, with the petals on the margin. Exalbuminous. Leaves opposite. Stamens definite.

Order 50.—Onagraceæ.—Ovaries several. Flowers polypetalous or apetalous. Calyx valvate. Stamens definite. Cotyledons flat, much larger than the radicle.

Group XX.—Cucurbitales.

Ovary compound, 2 to several celled (or one-celled by abortion); placentæ parietal. Calyx adherent. Corolla frequently monopetalous. Stamens united either by their filaments or their anthers. Flowers monœcious or diœcious.

Order 51.—Cucurbitaceæ.—Fruit pulpy. Placentæ parietal; mostly monopetalous.

Group XXI.—Saxifragales.

Ovaries two or more, many-ovuled, distinct, or partly united; sutural or axile placentæ. Seeds indefinite, with a little albumen. Petals and stamens inserted on the calyx.

Order 52.—Saxifragaceæ.—Styles distinct. Leaves alternate.

Group XXII.—Umbellales.

Ovary compound, 2 (sometimes 3-5) celled, with a solitary ovule suspended from the top of each cell. Stamens usually as many as petals or lobes of adherent calyx. Embryo in a large quantity of albumen.

Order 53.—Apiaceæ.—Fruit didymous, with a double epigynous disk.

Order 54.—Araliaceæ.—Fruit not didymous, nor with a double epigynous disk. Flowers pentamerous. Corolla valvate. Leaves alternate, exstipulate.

Order 55.—Cornaceæ.—Fruit not didymous, no double epigynous disk, 2 to more celled. Flowers tetramerous. Corolla valvate. Leaves opposite, exstipulate.

Order 56.—Hamamelidaceæ.—Fruit not didymous, no double epigynous disk, 2-celled. Corolla imbricated. Leaves alternate, stipulate.

Sub-Class II.—Monopetalous Exogenous Plants.

Floral envelopes consisting of both calyx and corolla; the petals more or less united.

Group XXIII.—Cinchonales.

Ovary coherent with the calyx, 2 to several celled, with one or more ovules in each cell. Seeds albuminous. Stamens inserted on the corolla.

Order 57.—Caprifoliaceæ.—Stamens epipetalous; anthers straight, bursting longitudinally. Fruit consolidated. Leaves exstipulate.

Order 58.—Cinchonaceæ.—Stamens epipetalous; anthers straight, bursting longitudinally. Leaves stipulate.

Order 59.—Rubiaceæ.—Stamens epipetalous; anthers straight, bursting longitudinally. Fruit didymous. Leaves verticillate; exstipulate.

Group XXIV.—Valerianales.

Ovary coherent to the calyx, with one cell and one ovule, sometimes with 3 cells, two of which are abortive. Seeds suspended. Embryo with little or no albumen. Stamens distinct, inserted on the corolla.

Order 60.—Valerianaceæ.—Corolla imbricated. Anthers free. Ovary one-celled. Ovule pendulous. Exalbuminous.

Group XXV.—Asterales.

Ovary coherent to the calyx; one-celled. Seeds erect. Stamens syngenesious. Exalbuminous.

Order 61.—Asteraceæ.—Corolla valvate. Anthers syngenesious. Ovule erect. Exalbuminous.

Group XXVI.—Campanales.

Ovary coherent to the calyx, with two or more cells and numerous ovules. Stamens inserted with the corolla. Anthers not opening by pores.

Order 62.—Campanulaceæ.—Ovary 2 or more celled. Anthers free, or half united. Stigma naked. Corolla regular; valvate.

Order 63.—Lobeliaceæ.—Ovary 2 or more celled. Anthers coherent. Stigma surrounded by hairs. Corolla irregular; valvate.

Group XXVII.—Ericales.

Ovary free from the calyx, superior, or sometimes coherent with it; with

two or more cells, and numerous ovules. Albuminous. Placentæ axile. Stamens definite; anthers usually opening by pores or chinks.

Order 64.—PYROLACEÆ.—Flowers half monopetalous. Stamens all perfect, free. Seeds with a loose skin. Embryo at the base of the albumen.

Order 65.—ERICACEÆ.—Flowers monopetalous. Stamens all perfect, free. Seeds with a firm or loose skin. Anthers 2-celled, opening by pores.

GROUP XXVIII.—EBENALES.

Ovary free, or rarely coherent to the calyx. Several-celled, but all abortive except one. Stamens definite; rarely indefinite; anthers not opening by pores.

Order 66.—AQUIFOLIACEÆ.—Stigmas simple at the end of a manifest style. Placentæ axile.

Order 67.—EBENACEÆ.—Stigmas simple, sessile, radiating. Stamens epipetalous or hypogynous.

Order 68.—STYRACACEÆ.—Stamens epipetalous. Ovules ascending or descending. Cotyledons leafy.

Order 69.—SAPOTACEÆ.—Seeds definite; pendulous. Corolla imbricated.

GROUP XXIX.—OLEALES.

Ovary free, 2-celled, few-ovuled; the cells 1-seeded; corolla regular; (sometimes polypetalous or apetalous.) Stamens fewer than its lobes.

Order 70.—OLEACEÆ.—Stamens free, two; (rarely four.)

GROUP XXX.—GENTIANALES.

Ovary free, compound, or the carpels 2 or more, and distinct; the ovules usually several, or numerous. Corolla regular. Stamens as many as lobes, and alternate with them.

Order 71.—APOCYNACEÆ.—Stigmas collected into a massive head, expanded at the base in the form of a ring or membrane, and contracted in the middle.

Order 72.—ASCLEPIADACEÆ.—Anthers and stigmas consolidated into a column.

Order 73.—GENTIANACEÆ.—Stigmas simple, at the end of a manifest style. Placentæ parietal. Flowers regular.

Order 74.—LOGANIACEÆ.—Leaves opposite, with intervening stipules.

Order 75. — CONVOLVULACEÆ.—Placentæ basal. Cotyledons leafy; doubled up. Leaves alternate.

Order 76.—SOLANACEÆ.—Stamens five, free. Placentæ axile. Embryo terete.

GROUP XXXI.—ECHIALES.

Ovary free, 2-4-lobed, and separating or splitting into as many 1-seeded nuts or achenia. Corolla regular or irregular. Stamens inserted on the tube, equal in number, or fewer than the lobes.

Order 77.—BORAGINACEÆ.—Flowers regular, symmetrical. Stamens 5, nuts 2 or 4; stigma naked. Inflorescence circinate.

Order 78.—LAMIACEÆ.—Flowers irregular; unsymmetrical. Nuts 4. Ovule erect.

Group XXXII.—Bignoniales.

Ovary free, 1-2 (or spuriously 4) celled, with numerous ovules. Corolla irregular, the stamens inserted on the tube, usually fewer than its lobes. Fruit capsular or berried. Embryo with little or no albumen.

Order 79.—Pedaliaceæ.—Placentæ parietal. Fruit bony or capsular. Embryo amygdaloid. Radicle short.

Order 80.—Bignoniaceæ.—Placentæ axile. Seeds winged, sessile, exalbuminous. Cotyledons large and leafy.

Order 81.—Scrophulariaceæ.—Placentæ axile. Seeds albuminous. Cotyledons scarcely larger than, or not as large as the radicle.

Group XXXIII.—Cortusales.

Ovary free, (or with the base merely coherent,) 1-celled, with a free, central placenta. Stamens as many as the lobes of the corolla. Embryo in a large deposit of albumen.

Order 82.—Plumbaginaceæ.—Stamens opposite the petals. Fruit membranous; 1-seeded. Styles 5. Stem herbaceous.

Sub-Class III.—Apetalous Exogenous Plants.

Corolla none; the floral envelopes consisting of a single series, (calyx,) or sometimes wholly wanting.

Group XXXIV.—Asarales.

Flowers perfect, with a conspicuous or coloured calyx. Ovary several-celled, many-ovuled. Fruit a capsule or berry. Embryo small, in a large quantity of albumen.

Order 83.—Aristolochiaceæ.—Ovules indefinite.

Order 84.—Santalaceæ.—Ovules definite, with a coated nucleus.

Group XXXV.—Chenopodales.

Flowers perfect, or rarely polygamous, with a regular and often petaloid calyx. Ovary 1 or several-celled, with a solitary ovule in each. Embryo curved, round, or applied to the surface of a mealy or horny albumen.

Order 85.—Phytolaccaceæ.—Sepals separate, flat. Stamens alternate with the sepals, or indefinite. Carpels several.

Order 86.—Chenopodiaceæ.—Sepals separate, or nearly so, flat. Stamens opposite the sepals. Anthers 2-celled. Ovary 1. One-seeded. Flowers naked.

Order 87.—Polygonaceæ.—Calyx coloured. Ovules orthotropal. Nut usually triangular.

Group XXXVI.—Daphnales.

Flowers perfect, sometimes polygamous or dicœcious, not disposed in aments, with a regular and more or less petaloid calyx. Ovary 1-celled, or rarely 2-celled, with one or few ovules in each. Fruit 1-celled and 1-seeded. Embryo not coiled round albumen.

Order 88.—Lauraceæ.—Anthers bursting by recurved valves. Leaves perfect. Fruit naked.

Order 89.—THYMELACEÆ.—Anthers bursting longitudinally. Apetalous or polypetalous. Ovule solitary; suspended. Calyx imbricated.

Order 90.—ULMACEÆ.—Ovary of two carpels. Calyx imperfect; divided at the edge. Cotyledons thin and leafy.

GROUP XXXVII.—PIPERALES.

Flowers perfect, destitute of both calyx and corolla. Embryo minute, at or near the outside of a large quantity of mealy albumen.

Order 91.—PIPERACEÆ.—Carpel solitary. Ovule erect. Embryo lying in a vitellus. Leaves opposite or alternate, with or without stipules.

GROUP XXXVIII.—URTICALES.

Flowers monœcious or diœcious, various; sometimes in fleshy heads, but seldom arranged in aments. Fruit an achenium, often enclosed in a baccate calyx. Embryo large, in a small quantity of albumen.

Order 92.—URTICACEÆ.—Radicle superior. Ovules solitary, erect. Embryo straight, albuminous. Juice limpid. Stipules small, flat.

Order 93.—CANNABINACEÆ.—Radicle superior. Ovule solitary, suspended. Embryo hooked. Exalbuminous.

Order 94.—MORACEÆ.—Radicle superior. Ovule solitary, suspended. Embryo hooked. Albuminous.

Order 95.—ARTOCARPACEÆ.—Radicle superior. Ovule solitary, erect or suspended. Embryo straight. Exalbuminous. Juice milky. Stamens large, convolute.

GROUP XXXIX.—AMENTALES.

Flowers monœcious or diœcious; the flowers in aments, or in heads or spikes. Carpels superior. Embryo small, with little or no albumen.

Order 96.—ALTINGIACEÆ.—Ovules indefinite. Seeds winged.

Order 97.—SALICACEÆ.—Ovules indefinite. Seeds cottony.

Order 98.—MYRICACEÆ.—Ovule 1, erect. Radicle superior.

GROUP XL.—QUERNALES.

Flowers diœcious, amentaceous. Fruit inferior. Embryo amygdaloid, without albumen.

Order 99.—CORYLACEÆ.—Ovary one or more celled. Ovules pendulous or peltate.

Order 100.—JUGLANDACEÆ.—Ovule solitary, erect.

GROUP XLI.—EUPHORBIALES.

Flowers monœcious or diœcious, not amentaceous. Fruit capsular or drupaceous, with 2 or more cells, and one (rarely two) seed in each. Embryo large in an abundant albumen.

Order 101.—EUPHORBIACEÆ.—Ovules definite, suspended, anatropal. Radicle superior.

Class II.—Gymnogens or Gymnospermous Plants.

Stems increasing by concentric layers, and with a structure as in the Exogens. Embryo, with two opposite, or several whorled cotyledons. Ovules naked, or not enclosed in an ovary, the carpel being absent or replaced by a flat scale.

Order 102.—Cycadaceæ.—Stem simple, continuous. Leaves parallel-veined, pinnate. Scales of the cone antheriferous.

Order 103.—Pinaceæ.—Stem repeatedly branched, continuous. Leaves simple, acerose. Females in cones.

Class III.—Endogens or Monocotyledonous Plants.

Stem without distinct bark or pith; the wood formed of bundles of fibres and vessels, irregularly dispersed through a cellular tissue; the rind closely adherent; no medullary rays or concentric layers; increase in size by the deposition of new fibrous bundles in the central part of the stem, within the old. Leaves seldom articulated, usually sheathing at base, with simple parallel veins. Embryo with a single cotyledon, or if a second be present, it is much smaller than the other.

Group XLII.—Palmales.

Flowers on a branched, scaly spadix, with a double perianth. Ovary 3-celled, with a single ovule in each cell. Embryo minute, below the surface of a horny or fleshy albumen.

Order 104.—Palmaceæ.—Unisexual. Flowers perfect. Fruit a drupe or berry.

Group XLIII.—Arales.

Flowers on a spadix, with a simple or scale-like perianth, or wholly wanting. Embryo in the axis of a mealy or fleshy albumen.

Order 105.—Araceæ.—Flowers indefinite, naked, on a solitary spadix, with a single-hooded spathe. Anthers sessile. Seed loose. Embryo slit, axile.

Group XLIV.—Alismales.

Flowers not spadiceous, hypogynous, bisexual, with a double perianth. Ovaries several, distinct or united. Seeds exalbuminous.

Order 106.—Alismaceæ.—Flowers tri-petaloid. Placentæ simple, axile, or basal. Few-seeded. Embryo solid.

Group XLV.—Juncales.

Flowers hypogynous, bisexual, herbaceous flowered, hexapetaloid, with an abundant albumen.

Order 107.—Orontiaceæ.—Flowers on spadix. Embryo axile, with a cleft on one side.

Group XLVI.—Narcissales.

Flowers with a regular perianth. Ovary 3-celled, many-ovuled. Stamens 3 or 6. Seeds albuminous.

Order 108.—Hæmodoraceæ.—Flowers hexapetalous, tubular, scarcely imbricated. Stamens 3 or 6; anthers turned inwards. Radicle remote from the naked hilum.

Order 109.—Iridaceæ.—Flowers hexapetalous. Stamens 3. Anthers turned outwards.

Group XLVII.—Amomales.

Flowers with an irregular perianth. Ovary 3-celled. Stamens 1—6, some of which are abortive. Seeds albuminous.

Order 110.—Musaceæ.—Stamens more than 1. Anthers 2-celled. No vitellus.

Order 111.—Zingiberaceæ.—Stamen 1. Anther 2-celled. Embryo in a vitellus.

Order 112.—Marantaceæ.—Stamen 1. Anther 1-celled. No vitellus.

Group XLVIII.—Orchidales.

Flowers with irregular perianth. Ovary 1-celled, with parietal placentæ. Stamens 1—3. Seeds without albumen.

Order 113.—Orchidaceæ.—Flowers irregular, gynandrous. Placentæ parietal.

Group XLIX.—Liliales.

Flowers with a regular hexapetaloid perianth, or rarely glumaceous. Seeds with a copious albumen.

Order 114.—Melanthaceæ.—Perianth naked, flat when withering. Anthers turned outwards; styles distinct; albumen fleshy.

Order 115.—Liliaceæ.—Perianth naked, flat when withering. Anthers turned inwards; styles consolidated; albumen fleshy.

Group L.—Smilicales.

Flowers perfect, diclinous or polygamous. Leaves reticulated. Carpels consolidated. Seeds albuminous.*

Order 116.—Smilaceæ.—Flowers unisexual, hexapetalous. Carpels several, consolidated. Placentæ axile.

Order 117.—Dioscoreaceæ.—Flowers unisexual. Perianth adherent. Carpels consolidated, several-seeded.

Group LI.—Glumales.

Flowers imbricated with bracts, and in spikelets; no proper perianth. Ovary 1-celled, 1-ovuled. Embryo at end of albumen, next the hilum.

Order 118.—Graminaceæ.—Styles 2 or more, distinct or united. Ovule ascending. Embryo lateral, naked.

Class IV.—Sporogens or Rhizanthous Plants.

Parasitic, leafless plants, with homogeneous stems, and a scarcely-developed vascular system, furnished with true flowers, but propagated by spores.

Order 119.—Rafflesiaceæ.—Ovules indefinite, parietal. Fruit many-seeded. Calyx 5-parted. Anthers opening by pores.

Series II.—Cryptogamous or Flowerless Plants.

Plants destitute of true flowers, and consequently of seeds. Reproduction by means of minute bodies called spores, mostly enclosed in cases, and without radicle or cotyledon.

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* This group forms part of a new class which Lindley has proposed under the name of Dictyogens, including in it a few orders which appear to form a link between the Exogens and Endogens, having some of the characters of each; but further observations are needed on the subject before this change can be adopted.

Class V.—Acrogens or Acrogenous Plants.

Flowerless plants with a regular stem or axis growing from the apex, composed of cellular tissue and vessels; usually furnished with leaves. Spores contained in a theca or case.

Group LII.—Filicales.

Vascular. Spore cases marginal, or dorsal. 1-celled. Usually surrounded by an elastic ring. Spores of one kind only.

Order 120.—Polypodiaceæ.—Spore cases ringed, dorsal or marginal, splitting irregularly.

Group LIII.—Lycopodales.

Vascular. Spore cases axillary or radical, 1 or many-celled. Spores of two sorts.

Order 121.—Lycopodiaceæ.—Spore cases 1-3 celled, axillary; reproductive bodies similar.

Class VI.—Thallogens or Thallogenous Plants.

Plants wholly formed of cellular tissue, with no distinction of stem or leaves. Not reproduced by buds, or by organs analogous to flowers.

Group LIV.—Algales.

Cellular, flowerless plants, nourished through their whole surface; living in water; propagated by zoospores, coloured spores, or tetraspores.

Order 122.—Fucaceæ.—Cellular or tubular, unsymmetrical bodies, multiplied by simple spores formed externally.

Order 123.—Ceramiaceæ.—Cellular or tubular unsymmetrical bodies, multiplied by tetraspores.

Group LV.—Fungales.

Cellular, flowerless plants, nourished through their thallus; living in air; propagated by colourless or brown spores, and destitute of green gonidia.

Group LVI.—Lichenales.

Cellular, flowerless plants, nourished through their whole surface; living in air; propagated by spores usually enclosed in theca, and always having green gonidia.

DESCRIPTION OF PLANTS USED IN MEDICINE.

Series I.—Phænogamous or Flowering Plants.

Substance of the plant composed of cellular tissue, woody fibre, ducts and spiral vessels. Leaves usually present; cuticle with stomata. Sexual organs always present, and usually surrounded by a floral envelope. Reproduced by means of seeds, having distinct coverings, cotyledons, and a radicle and embryo.

Class I.—Exogenæ.—*De Candolle.*—Dicotyledonous Plants.

Trunk, consisting of concentric layers, surrounding a central column of pith, and composed of two parts, wood and bark; *wood* consisting of ligneous strata, traversed by *medullary* rays, and increasing by the deposit of new matter on the outside, (the older and inner layers called *duramen* or *heart-wood*, and the newer and outer, termed *alburnum* or *sapwood.*) Bark formed of strata, increasing by the deposit of new matter on its inner side. Leaves jointed at their union with the stem, and having their veins and nerves much and irregularly ramified (*reticulated*). Flowers usually with a distinct calyx and corolla (*double perianth*); frequently having a quinary arrangement, or occasionally binary, or of some of the multiples of two. Embryo with two opposite cotyledons. Radicle naked.

Sub-Class I.—Polypetalous Exogenous Plants.

Floral envelopes, consisting of both calyx and corolla; the petals being distinct.

Group I.—Polycarpicales.

Ovaries several, or numerous, distinct; when in several rows, sometimes coherent, but not united into a compound pistil. Stamens and pistils inserted on the receptacle. Embryo small, in a large quantity of horny or fleshy albumen.

Order 1.—RANUNCULACEÆ.—*De Candolle.*

Herbaceous (seldom shrubby). Leaves alternate (rarely opposite), variously divided and having the petiole dilated at base, and partly clasping the stem. Sepals 3—6 or more, usually 5, seldom persistent. Petals 3 or many, hypogynous, occasionally wanting. Stamens many, hypogynous, anthers adnate or innate. Ovaries many (sometimes few or solitary), distinct; ovules solitary or many. Pericarps dry nuts, or achenia, or baccate, or follicular. Seeds with a horny or fleshy albumen.

The greatest number of species appertaining to this order are found in Europe, amounting to one-fifth. North America contains about one-seventh. They being characteristic of a cool climate, all those met with in tropical countries inhabit mountains. Many of them were at one time employed in medicine, but with a few exceptions, have fallen into disuse. They are in general acrid and caustic, but are very various in their physical properties. Thus, in many of them, there is a volatile acrid principle of a very peculiar nature, destructible by heat, or even by simple drying, but neither acid nor alkaline; in others, as in *Aconitum* and *Delphinium*, the active ingredient is an alkaloid, highly deleterious even in minute doses; in some again, the only marked properties are those of the pure bitters, as in *Coptis* and *Hydrastis*.

Tribe 1.—ANEMONEÆ.—Petals wanting, or plane. Anthers generally extrorse. Achenia numerous, caudate. Seed suspended.

CLEMATIS.—*Linn.*

Involucre wanting, or resembling a calyx below the flower. Sepals 4—8, coloured, valvate. Petals wanting, or shorter than the sepals. Anthers extrorse. Achenia numerous, terminating in a long feather-like tail.

The species of this genus are perennial herbaceous, or half shrubby plants, often sarmentose; with opposite leaves. They are in most cases so acrid as to blister the skin if applied to it in a fresh state, but their activity is destroyed by drying or exposure to heat. The *C. erecta*, *C. flammula*, and *C. vitalba* of Europe, were at one time employed as rubefacients and vesicants, but are now seldom used in regular practice. Wendt, however, has spoken of the last-mentioned species as useful in scrofula, itch, and many cutaneous diseases. The young shoots are used in some parts of Italy as a substitute for Asparagus. Some of our native species, as *C. viorna*, and *C. virginica*, have also been employed, both externally in the treatment of eruptions and as vesicants, and also internally as diuretics and sudorifics in chronic rheumatism, &c. The *C. dioica*, a native of Jamaica, is said by Dr. Macfadyen (*Flor. Jam.* 1, 2,) to be active; a decoction of the root in sea-water acting as a powerful hydragogue purgative in dropsy; and an infusion of the leaves and flowers removing spots and freckles from the skin. The *C. mauritiana* is stated by Commerson, to be used in the Isle of France as a revulsive in cases of toothache, neuralgia of the face, &c. (*Encyclop. Meth.* ii. 42.)

ANEMONE.—*Linn.*

Involucre 3-leaved, distant from the flower, its leaflets incised. Sepals 8–15, petaloid. Petals none. Achenia mucronate or caudate.

These are perennial herbs with radical leaves. The medical properties are very similar to those of Clematis, but more active. The *A. pulsatilla* and *A. pratensis* had some reputation in the treatment of cutaneous disorders, and in amaurosis, in consequence of the experiments of Störck; he used an extract, at first in small doses, but gradually increasing the quantity till some marked effect was produced. Bonnet, (*An. Jour. de Med.* 1783,) also speaks highly of this extract in obstinate cutaneous affections; and Dr. Ramm, (*Arch. Gen. de. Med.* 1828,) states that in small doses it is eminently successful in hooping cough. It is probable that the *A. patens*, a native both of Europe and North America, is analogous in its properties to the above. The root of *A. cernua*, a native of Japan and China, is in high repute in those countries as a bitter tonic.

HEPATICA.—*Dillenius.*

Involucre caliciform, 3-parted, very near the flower, persistent. Sepals petaloid, 6—9. Petals none. Stamina many, short. Achenia awnless.

This genus, which consists of but a single species, is found in the northern parts of Europe, Asia, and America, occurring in the latter from Canada to South Carolina and to the Pacific. It was first recognised by Tournefort, but placed in Anemone by Linnæus, and again separated by Dillenius, in which he has been followed by all modern botanists.

Fig. 48.

H. triloba.

H. TRILOBA.—*Chaix.* Leaves broadly cordate, 3—5-lobed, lobes entire.

Chaix, *Vill. Delph.*, i. 336. Pursh, *Fl.* ii. 391. Torrey and Gray, *Flor.* N. A. i. 14. Rafinesque, *Med. Flor.*, i. 238.

Common names. Liverwort, Liverweed, Trefoil, &c.

Description. Root perennial, fibrous. Leaves radical, on long hairy petioles, somewhat coriaceous, cordate at base, and divided into three equal lobes, which are either rounded, obtuse, or acute, purplish beneath and green, mottled with purple, above. Scapes several, the length of the petiole, round, hirsute, single-flowered, and invested at base with membranous sheaths. Flowers terminal, at first drooping, afterwards erect. Involucre resembling a calyx, very hirsute, with deep ovate, entire segments. Sepals in two or three series, purplish or white, equal, ovate, obtuse. Stamens subulate, anthers elliptic. Seeds ovate, acute, awnless.

There are two marked varieties of this plant, which have been considered as species by some writers; one having the lobes of the leaves rounded (*H. obtusa*) and the other with them spreading, and acute. (*H. acuta.*) Both these are found in abundance in the Northern and Middle States, but the first is the most common. Their usual place of growth is the sides of wooded hills and mountains, where their delicate purplish flowers may be seen among the earliest of the harbingers of spring; the leaves are persistent until after the flowers appear, when they decay and fall off, and are succeeded by another crop. The Liverwort is scentless and nearly insipid, though a little astringent and mucilaginous.

Medical uses. The whole plant is used, and was long esteemed as a pectoral and deobstruent, but probably possesses very slight powers. The earlier writers describe it as "a noble vulnerary, used either inwardly or outwardly;" and as capable of curing hernia, all diseases of the liver, and even palsy. It, however, fell into deserved disrepute, and only requires notice

from the fact of its having been lauded in this country some years since, as a remedy in hæmoptysis and other pectoral affections, in the treatment of which it still enjoys much popular confidence. It is used as a tea, either warm or cold, and may be taken in large quantities; it has no effect on the lungs, other than that of a mild astringent and demulcent.

Hydrastis.—*Linn.*

Sepals 3, petaloid, deciduous. Petals none. Stamens many, with innate anthers. Styles numerous, short, with dilated anthers. Carpels baccate, compound; granulations 1–2-seeded.

This genus of a single species is peculiar to North America. It was first included by Linnæus in Hydrophyllum, but afterwards separated under its present name at the suggestion of his industrious correspondent Mr. John Ellis, and has been adopted by all botanists except Miller, who, in his Gardener's Dictionary, terms it *Warnera*. Walter has noticed another species, which is also included by Muhlenberg in his catalogue, though as doubtful; it has not since been detected, and is most likely a mere local variety.

Fig. 49.

H. canadensis.

H. canadensis.—*Linn.* Stem alternately 2-leaved. Flower solitary, terminal.

Linn. *Sp. Pl.* 784; Torrey & Gray, *Flor. N. A.* i. 40; Barton, *Veg. Mat. Med.* ii. 17; Rafinesque, *Med. Flor.* i. 251.

Common names. — Yellow-Root, Yellow Puccoon, Ground Raspberry, &c.

Description.—Root perennial, of a bright yellow colour, tortuous, rugged, with numerous long fibres. Stem simple, upright, pubescent, about a foot in height, with two unequal terminal leaves, from the base of the smaller of which proceeds a peduncle bearing a single white or rose-coloured flower. This appears whilst the leaves are small, but these organs increase rapidly in size as the plant advances to maturity. The fruit is a berry of a red colour, formed of many oblong granulations, each of which contains one or two obovate seeds of a black colour, having a minute embryo at the base of a fleshy and oily albumen.

The Hydrastis is found in most parts of the United States, being most common to the west of the mountains; near Philadelphia it is very rare. The flowers are exceedingly fugacious, the petaloid sepals falling off soon after they expand; they appear in April

and May, and are succeeded by the bright red fruit which closely resembles a raspberry, but is not edible.

It was well known to, and used by the Indians both as a dye, and for medicinal purposes, the root yielding a brilliant yellow colour which appears to be permanent, and might be advantageously employed in the arts. In an account of the principal dyes used by the Indians by Hugh Martin, in the third volume of the Trans. Amer. Phil. Soc. 1783, he states that from experiments made with this article by himself and others, it was found to succeed perfectly with silk, wool, and linen, and by the addition of indigo, to furnish a rich green.

Medical Uses, &c.—The Hydrastis is a powerful tonic bitter, and may be used wherever such remedies are required. It is much employed in some of the Western States as a wash in chronic ophthalmia and other diseases of the eyes, and there is some evidence of its efficacy in these complaints. It also enters into the composition of some cancer powders, but there is no reason to believe, that it can exercise any influence on this formidable disease, more than any other mild tonic detergent. No analysis has been made of it, nor are its medicinal properties fully known; there is some evidence that besides its tonic qualities, it is also slightly narcotic, at least in a fresh state. It is given in tincture, decoction, and powder.

Tribe 2.—RANUNCULEÆ.—Calyx with a valvate æstivation. Petals furnished with a nectariferous scale at the inner base. Achenia without tails. Seed erect, sometimes suspended.

RANUNCULUS.—*Linn.*

Sepals 5. Petals 5 or many, with a glandular scale or spot at base. Stamens numerous. Achenia ovate, pointed, compressed, disposed in cylindrical or rounded heads. Seed erect. Herbaceous, annual or perennial. Leaves mostly radical, though cauline at the base of the branches and peduncles.

This is a very extensive genus, and the species, with few exceptions, are all acrid and caustic when fresh, but are inert or nearly so when dried. They are all herbaceous, and are natives of temperate or cold climates, where they are found in great abundance. De Candolle enumerates 159 species, of which upwards of forty are indigenous to North America.

R. ACRIS.—*Linn.*—Calyx spreading, villous. Carpels roundish, compressed, terminated by a short recurved style. Leaves 3–5 parted, segments laciniately trifid, uppermost linear.

Linn. *Sp. Pl.* 779; Tor. & Gray, *Fl.* i. 21; Stokes, *Bot. Mat. Med.* iii. 266; Steph. & Church. *Med. Bot.* ii. 82; Rafin. *Med. Flor.* ii. 72; Lindley, *Flor. Med.* 5.

Common names.—Buttercup, Meadow-bloom, Blister-weed, &c.

Description.—Root perennial, somewhat bulbous, with long simple fibres. Stem high, erect, round, hollow, leafy, with minute hairs, branched, many-flowered. Radical leaves oblong, hairy, with three to five lobes, which are variously subdivided and toothed. The leaves of the stem are divided into fewer and narrower segments, sometimes entire and linear. The flowers are terminal, of a bright yellow colour, and succeeded by ovate pericarps consisting of many achenia, each of which is lenticular, smooth, and terminated by a slightly-curved point.

Linnæus gave this species the name of *acris* on account of its highly acrid and caustic properties, though it does not appear to possess these qualities in

Fig. 50.

R. acris.

any higher degree than many of the others. It is probable that it is not a native of the United States, but like several others of the genus, has been introduced from Europe. It is now, however, extremely abundant in meadows and other damp spots. This plant and the *R. bulbosus*, the *R. flammula*, and the *R. sceleratus* are so identical in their properties, that they may be indiscriminately employed. They are all pervaded by an acrid, volatile principle, which is destroyed by the action of heat or even by drying. It may, however, be collected by distillation. Dr. Bigelow, in his experiments on several species of the genus, found, that whilst the distilled product was very acrid, the residuum was inert and tasteless. This distilled water when first tasted, excited no peculiar sensation, but in a short time a sharp, burning effect was produced; when swallowed, it caused a great sense of heat in the stomach. It may be kept in closely-stopped bottles for a length of time, without losing these properties. Tilebein states that the distilled water of the *R. sceleratus* is excessively acrid, and on cooling, deposits crystals, which are almost insoluble in any menstruum. Precipitates are caused by muriate of tin and acetate of lead.

Medical Uses.—From the caustic or acrid character of these plants, they were used as vesicatories, before the introduction of cantharides, and are still employed for the same purpose, where the Spanish-fly is not to be had, or where its use is contra-indicated. In most persons, they act promptly, when applied to the skin, exciting redness and even vesication in half an hour, but in consequence of their acting differently on different individuals, they should always be used with much caution. In some persons scarcely any effect is produced, whilst in others, on the contrary, their action is like that of a poison, causing deep and extensive ulcerations, which are very difficult to heal. At the same time, from their prompt powers, they have been found of much benefit as counter-irritants in rheumatism, neuralgia, &c., or wherever a powerful impression is wished to be made on the surface.

Tribe 3. HELLEBOREÆ.—Calyx petaloid, with an imbricate æstivation. Petals irregular, sometimes wanting. Carpels follicular, many-seeded.

HELLEBORUS.—*Linn.*

Sepals, 5, persistent. Petals 8 or many, bilabiate, tubular. Carpels many-seeded, coriaceous, nearly erect.

This genus of plants is principally European, and has long been celebrated

for the active properties of some of its species. These differ from those of most of the Ranunculaceæ, in not being dependent on an acrid, volatile principle, which is most powerful when the plants are in a fresh state. In the Helleborus they depend on a permanent resinous substance, which although somewhat impaired in energy by drying, is not destroyed. None of these plants are indigenous to North America, but are to be met with in gardens; being cultivated on account of the beauty and early appearance of their flowers. Two species are officinal in the U. S. Pharmacopœia, the *H. niger* and *H. fœtidus*.

H. NIGER.—*Linn.*—Leaves radical, pedate. Scapes radical, one or two-flowered. Bracts ovate.

Linn. *Sp. Pl.* 783; Woodville, *Med. Bot. t.* 169; Steph. & Church. *Med. Bot.* i. 11; Lindley, *Flor. Med.* 6.

Common names.—Hellebore, Black Hellebore, Christmas rose.

Foreign names.—H. à fleurs roses, Rose de Noel, *Fr.* Schwartze Neiswurz, *Gr.* Elleboro nero, Erba nocca, *It.*

Description.—Root horizontal, externally blackish, rough, with numerous fleshy fibres about the size of a quill. Leaves large, radical, on long petioles, variously divided into leaflets which are coriaceous, shining and serrate at their upper extremity. Flowers on scapes having bracts near the flowers. The petaloid calyx consists of five large, concave sepals, at first of a white colour, then becoming of a rose red, and finally changing to a green. The petals are tubular and two-lipped, of greenish-yellow colour. The stamens are very numerous and support yellow anthers. The ovaries are from six to eight in number, surmounted by a somewhat curved pistil. The capsules contain many black, shining seeds.

Fig. 51.

H. niger.

The Black Hellebore, so called from the colour of its roots, is a native of mountain woods in many parts of Europe, and is cultivated in gardens as an ornamental plant. In France

and England in mild seasons it flowers in the winter, whence its name of Christmas rose. It is described by the earlier writers on drugs, under the name of Melampodium, from an idea that it was identical with the celebrated remedy in mental affections, so highly praised by the Greek physicians; the observations of Tournefort and Sibthorp, however, have clearly demonstrated that the Melampodium of the ancients is a distinct species, the *H. orientalis*.

The fibres of the root, which are the parts employed in medicine, as found in the shops, are of a black colour, with a disagreeable smell, and a bitterish, nauseous, acrid taste. When fresh they are extremely powerful. Grew says of them: "The root being chewed, and for some time retained upon the tongue, after a few minutes it seemeth to be benumbed and affected with a kind of paralytic stupour; or as when it hath been a little burnt with eating and supping any thing too hot." This acrimony is much diminished by drying. From the analysis of MM. Fenuelle and Capron, it would appear that these roots contain no alkaloid, but that their powers depend on a resinous matter and volatile acid somewhat like the cevadic; to the latter is probably owing the acrid properties of the fresh root, whilst its purgative qualities may be attributable to the resin, as it has been found that alcohol extracts its virtues most effectually.

Medical Uses.—At one period, no medicine enjoyed a higher reputation than the Black Hellebore as a hydragogue purgative and emmenagogue. It was highly extolled by all the early writers on medicine, in mania, dropsy, cutaneous affections and worms, and was supposed to exercise a peculiar influence on the uterus. It formed the basis of Bacher's pills, so celebrated in the treatment of dropsy, the receipt for which was purchased at a high price by the French government, but like many other nostrums have been forgotten and despised, in the rage for others of quite as doubtful efficacy. The use of the Hellebore is now very limited, being seldom given except as an emmenagogue by some practitioners, who still place much faith in its powers.

Fig. 52.

H. orientalis. 1. Sepal with attached petals. 2. Pistils with stamen and petal.

The dose of the powdered root is from 10 to 20 grains as a purgative; of the decoction a fluid ounce three or four times a day till it operates; of the extract from 3 to 10 grains; and of the tincture twenty to sixty drops.

Several other species of Hellebore are considered as officinal, among which may be noticed the *H. fœtidus*, included in the secondary list of the U. S. Pharmacopœia. This is a perennial species indigenous in most parts of Europe, in pastures and thickets, most plentifully in a calcareous soil. It has an offensive odour, and is possessed of highly energetic and poisonous qualities, being even more powerful than the last-mentioned species. It has long been used in England as a popular remedy for worms, but some years since was brought to the notice of the profession by Dr. Bisset, as an almost in-

fallible vermifuge, and likewise beneficial in some asthmatic and mental affections. From its violent action, it is however but seldom used, and might with great propriety be discarded from the officinal lists.

The *H. orientalis*, *Lam.*, as has been stated, is the celebrated Melampodium of the ancients, and is still employed by Turkish physicians as a drastic purgative, and is highly prized by them in the treatment of many diseases. It is said by Allioni and others that the *H. viridis* is almost identical in its effects with the *orientalis*, and should be employed in preference to the Black Hellebore, as more certain and energetic.

Coptis.—*Salisbury.*

Sepals 5—6 petaloid, caducous. Petals 5—6 cucullate. Stamens many, hypogynous. Capsules many, stipitate, oblong, stellately diverging, 1-celled, 4—8-seeded.

These plants were included by Linnæus in the genus Helleborus, but were separated by Salisbury on account of the stipitate capsules and difference of petals. They are herbaceous, with radical and somewhat coriaceous leaves, and very slender, wide-spread roots. They are peculiar to the northern parts of Asia and America.

C. trifolia.—*Linn.* Leaves 3-foliolate; leaflets broadly ovate, dentate. Scape short, one-flowered. Roots filiform, creeping.

Salisbury, *Linn. trans.*, viii. 305; Bigelow, *Med. Bot.*, i. 60; Barton, *Veg. Mat. Med.*, ii. 97; Rafinesque, *Med. flor.*, i. 127.

Common names. Gold-thread, Mouth-root, &c.

Description.—Roots perennial, of a bright yellow colour, small and creeping. Stems slender, round, and furnished at base with imbricate yellowish sheaths. The leaves are evergreen, on long slender petioles, ternate and much veined. The scapes are as long as the leaves, slender, one-flowered, with a small mucronate bract, below the flower. The corolla has from five to seven oblong, concave, nectariform petals. The calyx is from five to seven-sepalled. The stamens are numerous, with adnate globose anthers. The styles are short and curved, with acute stigmas. Capsules are oblong, rostrate, on long divaricate pedicels, and containing many small seeds attached to one side.

Fig. 53.

C. trifolia.

This species is found from New York to Greenland, and also in Siberia and Iceland. It grows in sphagnous swamps and boggy woods. There are two other species which differ in many points from the present, and have been considered as distinct genera by some botanists. It

blossoms early in the spring, but continues in flower until July. The parts used are the roots; these should be gathered in the autumn, and carefully dried. They are of a bright golden colour, whence the common name of the plant.

Medical Uses.—The Coptis is a pure and powerful bitter, without the least astringency, somewhat resembling that of Quassia, but not as powerful, and far more palatable. It imparts its virtues to water as well as to alcohol. It may be used in all cases where a bitter tonic is admissible. It has been much employed in the Eastern States as a local application in aphthous and other ulcerations of the mouth. Dr. Bigelow, however, is of opinion that its efficacy in these complaints has been overrated, but the concurrent testimony of other writers is in its favour. It is also used as a stomachic in dyspepsia and loss of appetite; in such cases it is given in the form of tincture. Another species, the *C. teeta*, peculiar to India, is much esteemed among the natives as a tonic and stomachic, and from the experiments made with it by Mr. Twining, it would appear to justify the high character that has been bestowed upon it; it very closely resembles the *C. trifolia* in its sensible qualities and medicinal properties. (*Trans. Med. and Phys. Soc. Calcutta*, viii.)

Nigella.—*Tournefort.*

Sepals 5, petaloid, coloured, deciduous. Petals small, 5—10, bilabiate, with a nectariferous claw. Stamens many. Ovaries 5—10, united at base, with long simple styles. Carpels more or less united, opening by the ventral suture, many-seeded.

A small genus, with multifid, capillary leaves often surrounding the flowers like an involucre. The seeds of some of the species are aromatic and subacrid, and were formerly used as a substitute for pepper, and also as a carminative. It is supposed by Royle that a pungent seed employed by the Affghans in their curries is derived from a plant of this genus, and that it is the Black Cummin spoken of in the Scriptures.

Delphinium.—*Linn.*

Sepals 5, caducous, petaloid; the upper one with a spur at base. Petals 4, irregular, the two upper with a spur-like appendage at base, contained in the spur of the calyx. Ovaries 1-5. Pericarps follicular, many-seeded.

This beautiful and extensive genus consists of herbaceous annual, or perennial plants with erect branched stems, and much-divided leaves. The flowers, which are generally showy, are in terminal racemes and mostly of a blue colour. Many species are natives of North America, and are known under the name of Lark-spur.

D. consolida, *Linn.*—Stem erect, almost glabrous, flowers few in a loose raceme; bracts shorter than the pedicels; carpels smooth.

Linn. *Sp. Pl.* 748; *Eng. Bot.* 1839; Torrey and Gray *Flor. N. A.* i. 30; Pursh. Flor. ii. 372.

Common names.—Lark-spur, Stagger-weed, &c.

Description.—Stem erect, cylindrical, divaricate. Leaves sessile, divided into linear segments, usually bifurcate at top. The flowers are blue, forming loose, few-flowered terminal racemes, on rigid peduncles which are furnished with two small alternate bracts. Nectaries one-leaved, with an ascending anterior spur, about the length of the corolla. Carpels follicular, smooth, containing numerous black or blackish-brown seeds, which are hirsute. Annual, herbaceous.

This species is not a native of the United States, but having been introduced from Europe as an ornamental plant, it has become naturalised in some places, especially in Virginia, where it was first noticed by Pursh. In a wild state, the flowers are blue, but when cultivated, they are found of various colours, usually, however, white, red, or blue. Although an annual, the finest flowers are obtained from seed sown late in the summer or commencement of autumn; the young plants are not affected by the winter frosts, and flower earlier and more vigorously than when wholly annual. All parts of the Lark-spur are endowed with an acrid and bitter principle, which is most strongly developed in the seeds, which also contain much oil. The flowers, by expression, furnish a blue pigment, which is permanent if alum be used as a mordant.

Medical Uses.—The Lark-spur was formerly in some repute as a medicinal agent in a variety of diseases. The decoction of the flowers was considered as efficacious in affections of the eyes. A tincture of the seeds has also been recommended, in calculus, and as a vermifuge, and for the purpose of destroying lice in the hair. It owes its active powers to the presence of a peculiar principle, *Delphinia*, first detected by MM. Lassaigne and Fenuelle in the *D. staphisagria*, and lately shown to exist in the present species by Mr. T. C. Hopkins (*Amer. Jour. Pharm.* v. 1). The root is the only part recognised as officinal by the U. S. Pharmacopœia, but is seldom or never used. The *D. staphisagria*, the officinal species of the foreign Colleges, is a native of the south of Europe, and is very showy and ornamental, but is seldom cultivated in this country. It is possessed of the same properties as the last, and in a higher degree. The seeds, under the name of Stavesacre, have been long in use as a popular remedy against vermin in the hair, and for the purpose of intoxicating fish. They were also recommended by the earlier physicians as emetics, cathartics and diuretics, but from the occasional violence of their action are now seldom prescribed. Their principal use is in veterinary practice, to destroy vermin on horses and other animals.

Aconitum.—*Linn.*

Sepals petaloid, irregular, deciduous, the upper one helmet-shaped. Petals five, the three lower minute, often converted into stamens; the upper pedunculate, recurved. Carpels 3–5, many-seeded.

The meaning of the generic name is by no means clear; some writers derive it from Acone, a town of Bithynia; whilst others deduce it from a Greek word, signifying without dust; but the most probable idea is, that it comes from ακονη, a rock, the plant growing in rocky places. The species are all perennial and herbaceous, and are natives of many parts of the world; four of them are indigenous to North America. They are all acrid and poisonous; but several of them are cultivated on account of the beauty of their flowers. Much difference of opinion has prevailed among botanists respecting many of the species, rendering it very difficult to ascertain to what plant their descriptions refer. This is more particularly the case with those used for medical purposes, and hence we find different species recognised as officinal by the pharmaceutical authorities of Europe and this country. But as most, if not all, the species, are possessed of similar properties, and are indiscriminately collected and employed, this uncertainty is not attended with any real disadvantage. As the *A. napellus* is most generally recognised as the officinal species, and was the first known, this only will be particularly

noticed. In a late work on the subject by Dr. Fleming, he attempts to show that this is the only species possessing active properties, with the exception of the *A. ferox;* and that the *A. cammarum* and others, recognised as officinal by the various colleges of pharmacy, &c., are feeble and unimportant in their action. In this view of the subject, he is in some degree supported by Gieger; but the evidence of other experimenters goes to prove that most of the species, in their wild state, are possessed of extremely active and poisonous properties. Dr. Fleming appears to have employed cultivated plants in his experiments, and hence may have been led into error as to the real powers of the different species.

A. NAPELLUS, *Linn.*—Upper sepal arched behind; spur of upper petals nearly conical and deflexed, leaves palmate, segments cuneate.

Linn. Sp. Pl. 751; Stephenson and Churchill, *Med. Bot.* i. 28; Woodville, *Med. Bot.* t. 165; Lindley, *Flor. Med.* 11.

Common Names.—Wolfsbane, Monkshood, &c.

Fig. 54.

A. napellus.

Description.—Root simple or fusiform, woody. Stem erect, simple. Leaves palmate, deeply cleft, alternate. Flowers of a dark violet, or blue colour, in a terminal raceme, pedicels short. The petaloid sepals are five; the upper being helmet-shaped and concealing the petals, the lateral broad, rounded, the lower oblong and deflexed. The petals are usually not more than two; and are supported on a peduncle or claw, and have a hooked spur, and a bifid, revolute lip. The stamens are filiform, converging, with whitish anthers. The ovaries are from 3 to 5, with simple reflected stigmas. The capsules, which answer in number to the ovaries, contain many wrinkled, angular seeds.

This species varies much in the colour and size of its flowers, especially in a cultivated state, and is much prized as an ornament to the garden. It is a native of most parts of Europe, in mountain forests and plains, flowering in May and June. It was well known to the ancients, being mentioned by Ovid and Pliny. It was considered as the most virulent of all poisons, and was employed to destroy criminals condemned to death. The root is the most powerful; but every portion of the plant is possessed of highly deleterious properties. It has been asserted, that the mere smell of the herb in full flower is capable of affecting some persons with untoward symptoms. It loses much of its poison by drying; thus Linnæus states that it is fatal to cattle browsing upon it, but is innocuous to them when mixed with hay in a dry state. Many accidents have been recorded, where persons have died from using it in mistake for some other

plant. It is used in some parts of Europe to destroy wolves, whence one of its common names.

Medical Uses.—Although, as before mentioned, this plant was known to the ancients, it was introduced into regular medical practice by Störck, as a remedy in chronic rheumatism and various other disorders. He found it to act as a diuretic, diaphoretic, and narcotic. His observations led to its employment in other diseases; and it is now universally ranked among the most potent of therapeutic agents. In consequence, however, of its uncertain action, and its occasional production of alarming symptoms, it is not in general use. Its powers depend on an alkaloid principle, first noticed by Pallas, and subsequently by Brandes, who named it *aconita*. This principle is soluble in cold water, scarcely so in cold alcohol, but freely if heat be applied. The usual preparations in which Aconite is given are, the powder, extract, and tincture; the dose of the first is from one to three grains, two or three times a day, gradually increasing it if required. The extract varies much in strength, but its use should always be commenced in doses not exceeding half a grain. The tincture may be administered in doses of ten or fifteen drops. (See *Fleming on Aconitum.*)

The other species of Aconite are possessed of the same properties, some of them even in a greater degree, especially the *A. ferox*, a native of Nepaul, and described by Dr. Wallich as highly deleterious. Under the name of Bish or Vish it has long been known to the inhabitants of that country, and is used by them in time of war to poison their weapons, and even the water springs, when invaded by an enemy. The *A. neomontanum* and *A. cammarum*, as well as the *A. anthora*, appear to be equivalent to the *A. napellus*, and to be used for it. At one time it was supposed that the *A. anthora* was an antidote to the *thora* or common Aconite, as its name signifies; but the experiments of Hoffmann and others prove that it is full as dangerous a poison as the one it was thought to control. The *A. lycoctonum*, a native of the north of Europe, is much used for the purpose of poisoning wolves. It has also attained some celebrity, according to Martius, as a remedy in hydrophobia; the powdered root being applied to the wound until cicatrization has taken place. Like other vaunted specifics in this terrible malady, it is to be feared that its powers have been over-estimated, though, from the powerful influence of Aconite on the nervous system, far more reliance may be placed on it than in the powers of such worthless articles as Skull-cap, Pimpernel, and Water-plantain.

Pæonia.—*Linn.*

Sepals 5, unequal, leafy. Petals 5–10, roundish. Stamens many. Disk surrounding the ovaries, fleshy. Carpels 2–5, follicular, with double, persistent, sessile stigmas; many-seeded. Seeds dry, round.

These are herbaceous, sometimes shrubby, plants, with thick, fasciculate roots, and biternately-divided leaves. The flowers are terminal, solitary, and large. One species, the *P. officinalis*, a native of various parts of Europe, was at one time in high repute as a remedial agent; the seeds were considered to be eminently cathartic and emetic, and the root a powerful antispasmodic. The ancient writers, as Dioscorides (lib. iii. c. 127) and Pliny (l. xxv. c. 15), give particular directions in what manner the root was to be collected, considering it as an emanation from the gods, and capable of appeasing tempests, protecting from evil spirits, curing the most severe wounds,

&c. At a much later period, it is spoken of by eminent writers as highly valuable in all cases where a powerful antispasmodic is required; and hence it will be found to constitute an ingredient in all remedies for such cases, in the pharmacopœias of the last century. Modern experience, however, has shown that, although this root is possessed of some power in a recent state, still that it is far inferior to many other articles of the class, and that when dried, it is almost inert. The roots of some of the species are edible; thus Pallas states, that in Siberia, those of *P. albiflora* and *P. anomala* are a favourite food of the natives.

Tribe 4.—ACTÆEÆ.—Calyx coloured, imbricated. Fruit succulent, indehiscent, or follicular, one or many-seeded. Flowers sometimes unisexual by abortion.

CIMICIFUGA.—*Linn.*

Sepals 4—5. Petals 3—5, concave or unguiculate, sometimes wanting. Stamens many, anthers introrse. Style short; stigma simple. Carpels 1—8, follicular, many-seeded.

Much difference of opinion exists among botanists with regard to the true limits of this genus, some rejecting from it all the monogynous species, whilst others include them, merely making of them a separate section. The genus *Botrophis* of Rafinesque founded on the single pistil and single dehiscent capsule would now be adopted, were it not that the officinal species is still recognised in the U. S. Pharmacopœia, as Cimicifuga, as well as by our highest botanical authorities, Drs. Torrey and Gray.

C. RACEMOSA.—*Elliot.* Racemes very long, leaflets ovate, oblong, incisely toothed. Petals slender, 2-forked.

Elliot, *Sket.* ii. 16; Torrey and Gray, *Fl. N. A.* i. 36; *C. serpentaria.* Pursh, *Flor.* ii. 372; *Actæa racemosa*, Linn; *Botrophis serpentaria.* Rafinesque, *Med. Flor.* i. 85.

Common Names.—Black Snakeroot, Black Cohosh, Squaw-root, &c.

Description.—Root perennial, blackish, large, with numerous long fibres. Stem simple, smooth, furrowed, from three to six feet high. Leaves few, alternate, one nearly radical, large, decompound, and tri-pinnate; upper one bipinnate. Leaflets sessile, opposite, three to seven, dentate or incised. Flowers in a long terminal raceme, with oftentimes one or more shorter ones at base; this raceme is at first bent, but gradually becomes erect. The flowers are white and are supported on short pedicels, with a small subulate bract; the calyx is white and has four rounded sepals; the petals are very small, and shorter than the sepals, and cleft at their apex; the stamens are numerous, with yellow anthers; the pistil is oval, with a lateral, sessile stigma; the capsule is ovoid, dry, with one cell, containing many small flat seeds.

The Black Snakeroot is common in most parts of the United States, in open woods and hill sides, flowering in June and July, when its long white racemes are very conspicuous. The whole plant has a heavy, unpleasant smell when handled, and a disagreeable nauseous taste. There are several varieties, but they are not sufficiently distinct to require notice. This plant was placed in the genus *Actæa* by Linnæus, but removed by Pursh to *Cimicifuga*, also a Linnæan genus; in this as before said, he has been followed by many modern botanists, although it does not agree with the characters of the latter better than with those of the former. In 1808, Rafinesque made it the

type of his genus *Macrotys*, and altered the specific name to *actæoides*; this generic change was approved in part by De Candolle, who recognised it as a sub-genus of *Actæa*. In 1828, Rafinesque bestowed an entire new appellation on it, describing it in the Medical Flora as *Botrophis serpentaria*. Drs. Torrey and Gray consider it as a sub-genus or section of *Cimicifuga*. The portion of this plant employed in medicine is the root, which should be gathered early in the autumn, and dried in the shade. As found in the shops, it is in the form of a short, rugged, blackish-brown caudex, furnished with numerous long slender radicles, much wrinkled. It has, when fresh, a bitter, nauseous, and astringent taste, but in the dried state the first impression on the palate is mucilaginous and earthy, but in a short time succeeded by a disagreeable acrimony. From a want of due care in collecting and drying, it varies much in different samples. It has long been used in domestic practice in this country, and was one of the medical agents of the aborigines, being in high repute among them in the treatment of rheumatism, and as an emmenagogue. It is recognised by the U. S. Pharmacopœia in the secondary list, and although not generally used by the profession, is highly esteemed by some, in a variety of complaints.

Fig. 55.

C. racemosa.

Medical uses, &c. The Black Snakeroot is a stimulating tonic, and is capable of increasing the secretions from the skin, kidneys, and lungs; as to its power over the uterus, no satisfactory evidence has been adduced. Its principal celebrity has arisen from its efficacy in rheumatism and affections of the lungs; in the first of these complaints, there is every reason to believe that it has proved highly beneficial, and it deserves a more extended trial. It has been found very useful in phthisis, in combination with iodine, by Dr. Hildreth of Ohio. (*Am. Journ. Med. Sci. Oct.* 1842.) It was much used by the Indians as an antidote against the bites of venemous snakes, and from its stimulating diaphoretic properties it is likely that it may be useful for this purpose. The first attempt at analysis of it was by Dr. Mears in 1827, since which it has been examined by Mr. J. H. Tilghman in 1834 (*Journ. Phil. Coll. Pharm.* vi. 14), and by Mr. J. S. Jones in 1843 (*Am. Journ. Pharm.*

ix. 1) but with no very definite results; no peculiar principle was detected, the powers of the root appearing to depend on a somewhat volatile oil and a bitter resin, both soluble in alcohol, and partially so in water.

The Cimicifuga is generally given in a decoction made with an ounce of the root to a pint of water, the dose being one or more fluid ounces several times a day.

Actæa.—*Linn.*

Sepals 4–5. Petals 4–8, spatulate. Stamens indefinite; anthers introrse. Stigma sessile. Carpels solitary, baccate, many-celled. Seeds compressed, smooth, horizontal.

A small genus of perennial herbs, with leaves 2–3-ternately divided, and flowers in simple, white racemes. The species are found in the temperate regions of both hemispheres, and appear to be very analogous in their properties. As established by Linnæus, this genus contained several plants differing materially in essential characters, but has since been modified by more modern botanists.

A. spicata.—*Linn.*—Berries roundish. Petals as long as the stamens. Raceme ovate. Leaves 2-3 ternate.

Linn. *Sp. Pl.* 722; *Eng. Bot.* 918; Lindley, *Fl. Med.* 12.

Common names.—Bane-berry, Herb Christopher.

Foreign names.—Herbe St. Christophe, *Fr;* Achentragendes Schwazkraut, *Ger.;* Barba di Capra, *It.*

Description.—Root creeping and perennial. Whole plant smooth or slightly pubescent, about a foot and a half high. Stem triangular, leafy, but little branched. Leaves petiolated, twice or thrice ternate; leaflets ovate, lobed, unequally serrate. Flowers white, in a terminal, solitary ovate spike; pedicels simple, downy, bracteate at base. Sepals four, deciduous. Petals spatulate. Stamens subulate. Ovary ovate with a round sessile stigma. Berries purplish-black, succulent.

This plant is found in many parts of Europe, most frequently in mountainous woods. The whole plant is nauseous and fœtid. The root is a violent purgative, somewhat analogous in its effects to hellebore. The berries are poisonous, as is indicated by one of the common names of the plant. Linnæus states (*Flor. Lappon,*) that they cause violent delirium and death, and Dr. Lemercier, of Rochefort, found that they induced a species of intoxication followed by much disturbance of the cerebral functions, and irritation of the digestive organs. (*Merat & De Lens.*) These effects appear to depend on a volatile principle which is soon dissipated, as the dried plant may be administered in large doses without any ill consequences.

Medical uses, &c.—It is seldom employed internally, but a decoction of it is said to cure itch when applied externally, and also to destroy lice with as much certainty as the stavesacre.

There are two species, natives of the United States, the *A. rubra* and *A. alba*, the latter of which is very similar to the *A. spicata*. They are readily distinguished by the colour of their berries; their physical qualities, however, are identical, and both possess the deleterious qualities of the foreign plant. They are seldom used except in mistake for the *Cimicifuga*, with which they have been confounded by many writers; thus Merat & De Lens attribute all the properties of the *Cimicifuga* to the *Actæa*, mistaking one plant for the other, and state that they are indiscriminately employed by American physi-

cians; this is not the case, and as is observed by Dr. Tully, it is perhaps owing to an adulteration of the former with the latter, that it sometimes causes unpleasant effects. (*Bost. Med. & Surg. Jour.* viii. 133.)

The *A. cimicifuga*, a native of Siberia, is exceedingly fœtid, and is employed in that country as a remedy against fleas, and according to Gmelin is also considered as efficacious in dropsy. (*Flor. Sibir.* iv. 183.)

Zanthoriza.—*Marshall.*

Sepals 5. Petals 5 bilobate, pedicellate. Stamens 5–10. Pistils 5–10. Follicles small, mostly 1-seeded; seed suspended.

This genus contains but one species and is peculiar to North America. It was first described by Marshall, and has been recognised by all modern botanists.

Z. apiifolia, *L'Heritier.*—Leaves alternate, pinnate; flowers in a terminal lax panicle.

L'Heritier. *Stirp.* i. 79; Stokes, *Med. Bot.* ii. 194; Barton, *Veg. Mat. Med.* ii. 203; Torrey & Gray, *Fl.* i. 40.

Common names.—Yellow-root, Yellow-wort, &c.

Description.—A small shrub from two to three feet in height, with a horizontal root. The stem is simple and the bark smooth, enclosing a bright yellow wood. The leaves are pinnate, with incised leaflets, supported on long petioles which are somewhat amplexicaule at base. The flowers are in pendulous racemes, of a dark purple colour, and are succeeded by compressed semi-bivalve capsules, containing oval flattened seeds.

The Yellow-root is a native of the Southern States, principally restricted to the mountains; it is abundant along the lower parts of the Ohio, and in Tennessee, and North Carolina. It flowers in April. It first attracted attention on account of its tinctorial properties, which were well known to the Indians. It imparts a drab colour to wool, and a rich yellow to silk, but is said to have no effect on cotton or linen, though it is probable that with a proper mordant that it could be fixed on these articles also. With Prussian blue it affords a dull olive green.

Medical uses, &c.—The properties of this shrub are those of a pure bitter, which is most marked in the bark. From the experiments of Dr. Woodhouse, (*N. Y. Med. Repos.* ix. 291,) these qualities appear to depend on a bitter gum and resin, of which the latter is most abundant; no exact analysis of it has, however, been made. Dr. B. S. Barton was of opinion that the Zanthoriza is a more powerful bitter than Colomba, and it is probable that it is a good substitute for it or any other of the foreign simple tonic bitters. It may be given in decoction, tincture or powder; the latter in doses of two scruples agrees well with the stomach. From the intensely bitter character of the resin, alcohol would appear to be the best menstruum.

Many other plants of this extensive order have been employed as medicinal agents in different countries. Thus the leaves of *Knowltonia vesicatoria* are used as vesicants in South Africa, and those of several species of *Adonis* are very active, as Pallas states that those of *A. vernalis* are used in Siberia to procure abortion, and Clusius says that the roots were used as a substitute for Hellebore, and even considered to be the plant mentioned by Hippocrates under that name. In Africa the leaves of *A. capensis* and *A. gracilis* are employed as epispastics, in fact, they are all caustic, vesicant and dangerous. Rafinesque states that the roots of some of the native species of *Thalictrum*

are deemed efficacious in Canada, in bites of venemous snakes, and as a resolvent in contusions. The root of *T. flavum* is purgative, and according to Martius, is considered as beneficial in Russia, in cases of hydrophobia. A peculiar principle called *Thalictrine* has been obtained from it by Mr. Lesson, which, he says, is useful in intermittent fevers, in doses of 10 or 15 grains. The roots of *T. sinense* are said by Loureiro, (*Fl. Cochin*, i. 143,) to be laxative and demulcent, and to be used in China in pectoral complaints. The several species of *Trollius* and *Ficaria* have the same properties as those of Ranunculus, and were considered at one time as beneficial in scorbutic diseases, but are now gone out of use.

Order 2.—MAGNOLIACEÆ.—*De Candolle.*

Trees or shrubs with alternate, entire leaves, mostly coriaceous and minutely punctate, with convolute deciduous stipules. Flowers solitary, usually large, fragrant. Calyx caducous, of 3–6 sepals. Corolla of 3–30 petals in several rows. Stamens numerous, with adnate anthers. Ovaries several, distinct, superior, 1-celled; style short, with a simple stigma. Fruit various, of numerous 1–2-seeded carpels follicular or baccate, or woody, or fleshy; aggregated in a cone-like form on an elongated torus. Seeds anatropous, suspended or ascending, with a fleshy albumen containing a small embryo at base.

The plants of this order are remarkable for the elegance of their foliage, the size and fragrance of their flowers, and for their medicinal properties, which are those of aromatic, bitter tonics. They are natives of America and Asia, and are all trees or shrubs; no species are found in Africa or the adjacent islands.

Magnolia.—*Linn.*

Calyx with 3 sepals. Corolla of 6–12 petals. Carpels 1–2 seeded, persistent, forming a cone-like fruit; opening by a dorsal suture. Seeds fleshy, suspended when ripe by a thread.

This genus was dedicated by Linnæus to Magnol, Professor of Botany at Montpellier in the 17th century. It contains above seven or eight American species, and about as many Asiatic. Those peculiar to the United States are all trees, with fragrant flowers, and an aromatic, bitter bark. The medical qualities of all of them appear to be identical, and they may therefore be employed indifferently. The U. S. Pharmacopœia recognises three species in the secondary list, *M. glauca*, *M. acuminata*, and *M. tripetala*.

M. glauca.—*Linn.*—Leaves oblong or oval, obtuse, white beneath; petals 9–12, ovate, narrowed at base, erect.

Mich. *Arb. Fores.* iii. 77; Bigelow, *Am. Med. Bot.* ii. 67; Barton, *Veg. Mat. Med.* ii. 77; Rafin. *Med. Flor.* ii. 31; Torrey & Gray, *Flor. N. A.* i. 32; Lindley, *Flor. Med.* 23.

Common names.—White Bay, Beaver-tree, Sweet Magnolia, Small Magnolia, Swamp Sassafras.

Description.—Trunk with a smooth grayish bark, the branches crooked, and much divaricated. The leaves are alternate, of a long, oval shape, very entire, coriaceous, of a yellowish-green above, and glaucous beneath. The flowers are terminal and solitary, composed of many oval, concave, cream-coloured petals, and possess a bland and delicious odour. They are succeeded by small, squarrose, fleshy cones, of about an

inch in length, of a green colour tinged with red. These cones are formed of numerous cells, each containing a bright-red seed, which on the opening of the capsule at maturity, is for some time suspended by a delicate white thread, formed of spiral vessels.

Fig. 56.

M. glauca.

This species is found in most parts of the United States, but is principally confined to the maritime districts, being seldom met with at any great distance from the sea-board. It is most frequent in marshy places, but will flourish on dry soils. There are two marked varieties, one with broad, deciduous leaves, the other with the foliage persistent, narrow, and elliptical; the former is found principally to the North, as far as Cape Anne, and is very common in New Jersey and Delaware, whilst the latter is entirely confined to the South. The fragrance of the flowers is to most persons highly agreeable, but to others it is not only unpleasant, but absolutely deleterious, causing much oppression in the breathing, and faintness.

Medical uses, &c.—The magnolia is a tonic bitter of considerable power. The part used is the bark of the root, though that of the trunk and branches is fully as powerful. It was in use among the Indians as a remedy for autumnal fever and rheumatism, to fulfil a variety of indications, as a warm decoction acts as a gentle laxative, and then a sudorific, whilst in cold decoction, powder or tincture, it is tonic, and capable of arresting the paroxysms of intermittent fever. It is in great request for these purposes in many parts of the country, and much reliance is placed upon it in domestic practice; it has also proved highly beneficial in the hands of regular practitioners, in the treatment of remittents having a typhoid character. The cones and seeds are likewise employed to make a tincture, which is a popular remedy in the treatment of chronic rheumatism, and as a prophylactic against intermittent fever. The dose of the powdered bark is from half a drachm to a drachm; the decoction or infusion may be taken to any extent the stomach will bear. An extract has been made from it, but has not been sufficiently tested to judge of its powers. No correct analysis has been made of it, but it is probable that its constituents will be found the same as those of the *M. grandiflora*, which has lately been examined by Dr. Procter (*Amer. Journ. Pharm.* viii. 89); he found that the bark of this species afforded a green resin, a volatile oil, and a peculiar crystallizable principle analogous to Liriodendrin.

Fig. 57.

M. macrophylla.

The *M. acuminata* is a large tree found in the mountains of the interior of the United States, from New York to Georgia, and is popularly known under the name of Cucumber tree, from the size and form of its fruit. The *M. tripetala* has the same range, but is confined in a great measure to the lower grounds; it is known under the name of the Umbrella tree, on account of the great size and peculiar arrangement of its leaves. The *M. macrophylla*, a native of the Southern and some of the Western States, deserves notice from the magnificence of its foliage and flowers, which exceed in size those of any of our trees, the former being from a foot to two feet in length, and the latter almost a foot in diameter. The medicinal properties of these and the other species are identical, and as before stated, they may be substituted one for the other, without inconvenience. None of the species have edible fruits.

LIRIODENDRON.—*Linn.*

Calyx 3-sepalled, caducous. Petals 6, spreading. Carpels closely imbricated. Samara 1—2-seeded, indehiscent, deciduous.

This genus derives its name from the resemblance of its flowers to those of a lily. It consists of but few species, one of which is peculiar to North America, and the others to the eastern parts of Asia. They are all trees, sometimes attaining an enormous size.

L. TULIPIFERA.—*Linn.* Leaves truncate, 3—4-lobed.

Mich. *Arb. Fores.* iii. 202. Torrey and Gray, *Flor.* i. 43. Barton, *Veg. Mat. Med.* i. 91. Bigelow, *Med. Bot.* ii. 107. Rafinesque, *Med. Fl.* ii. 229. Lindley, *Flor. Med.* 23.

Common names.—Tulip tree, Poplar, American Poplar, White and Yellow Poplar, &c.

Foreign names.—Tulipier, *Fr.* Virginisher tulpenbaum, *Gr.* Tulipifero, *It.*

Description.—A very large tree, sometimes attaining a height of 100 to 120 feet, with a diameter of 6 to 10 feet. Bark much furrowed and rugged when old, but smooth when young. Leaves large, of a glossy green colour, trilobate, the middle lobe truncate, on long petioles. Flowers tulip-shaped, variegated, greenish-yellow externally, orange within. The petals are oblong and spathulate, nectariferous at base. The calyx is duplicate, having a two-leaved involucrum, and a proper tri-sepalled perianth, which becomes re-

volute as the flower expands. The stamens are numerous, with linear adnate anthers. The fruit consists of numerous long, narrow scales, attached at base to a common receptacle, so as to form an imbricated cone. The upper portion of each scale is winged.

Fig. 58.

L. tulipifera.

This magnificent tree is the pride of the American forest, and is remarkable for its great size, its striking foliage, its beautiful flowers, its useful wood, and its medicinal properties. It is found in most parts of the United States, from Canada to Florida, but is most common in Kentucky and Tennessee, sometimes forming extensive woods. There are two varieties, one having the side lobes of the leaves acute, and the other obtuse, as well as two varieties in the colour of the wood, one being white, and the other yellow, but it has not been clearly ascertained that the difference in the form of the leaf is attended with a change in the colour of the wood. Rafinesque in his Medical Flora attributes the white wood to the acute-lobed variety, and the yellow wood to the obtuse-lobed; but this opinion is not confirmed by any other writer. The general opinion is, that there is no mode of ascertaining what the colour of the wood is, except by inspection. This wood is much used in the United States for a variety of purposes, as it is light, easily worked, and fine-grained; when not exposed to the weather, it is very durable.

Medical uses, &c.—The bark of the Tulip tree closely resembles that of the Magnolia in its medical properties, but is less aromatic, and more stimulant. In warm decoction, it acts as a sudorific, and sometimes as a diuretic.

It has been most generally employed in the form of powder; this has been found highly useful as a tonic febrifuge in paroxysmal fevers. It has also been employed with some success in chronic diseases of the stomach and bowels. Dr. Young, in a letter addressed to Governor Clayton of Delaware, in 1792 (*Amer. Mus.* xii.), states in addition, that he has found it a most effectual remedy in hysteria, especially given in combination with a little laudanum, and also that he has never known it to fail in a single case of worms.

The best mode of administration, when the stomach will bear it, is in substance in doses of a scruple to two drachms; it may also be administered in extract, tincture, or decoction. The proper time for collecting the bark is during the winter.

Rafinesque states that the seeds are laxative, but this is noticed by no other writer, and requires to be confirmed. The leaves are used as external applications for headache, and an ointment prepared from them has obtained some celebrity in ulcers.

As found in the shops, the bark is a mixture of that of the trunk, branches, and root. The taste is pungent and aromatic, with some bitterness; that of the root, which should always be preferred, is more powerful than from any other part.

Several analyses have been made of the bark, the first of which was by Dr. Rogers in 1802; this, from the state of organic chemistry at that day, is of little interest, except that he found an acid, which he supposed to be hydrochloric, but which has not been detected by more recent experimenters. In 1832, Dr. J. P. Emmet published the results of his analysis (*Phil. Journ. Pharm.* iii. 5), and announced the discovery of a new principle, which he terms Liriodendrine. This is solid, brittle, and inodorous at 40°, fusible at 180°, and volatile at 270° F.; it can be partially sublimed, but never wholly so; it is soluble in alcohol, and is thought by the discoverer to be analogous

to camphor. It is obtained by treating the powdered bark with boiling alcohol of 89°, evaporating, and treating the soft residue with a weak solution of potassa. After several washings, the impure Liriodendrine is to be dissolved in alcohol, water added until an opalescent appearance takes place, on spontaneous evaporation, crystallization will ensue. This product is very analogous to that obtained by Dr. Procter from the Magnolia grandiflora, and can scarcely be considered as a peculiar principle, but is rather a compound body, consisting of a resin and a volatile oil. If the virtues of the Tulip tree bark depend on this substance, it is evident that it should be given in infusion rather than in decoction, but alcohol appears to be the most effectual menstruum.

Drymis.—*Forster.*

Calyx 2—3 cleft. Corolla 2—3 petals, (sometimes more.) Stamens numerous, clavate. Anthers 2-celled. Ovaries 4—8. Carpels congested, baccate, many-seeded.

This genus, which consists of several species of trees, all natives of South America, has been made the type of a natural order by some writers, on account of the pellucid dots in the leaves, and their presumed absence in the Magnolias, but as this character is present in Magnolia, it is evident that such a separation of closely-allied genera is not required.

D. winteri.—*Forst.* Leaves alternate, obtuse, oblong, glaucous beneath. Peduncles simple, approximated or very short, divided into elongated pedicels.

Forster, *Gen.* 84. Stevenson and Churchill, iii. 178. *Winterana aromatica.* Solander, *Med. Obs.* v. 46. *Wintera aromatica.* Murray, *Syst.* 507. Lindley, *Flor. Med.* 26.

Common name.—Winter's Bark tree.

Foreign names.—Canelle de Magellan, *Fr.* Corteccia Winteriana, *It.*

Description.—A very large tree, with a gray wrinkled bark on the trunk, but smooth and green on the branches. The branches are somewhat erect, and are furnished with obtuse, oblong, entire leaves, quite smooth, shining, and of a deep green colour above, and glaucous beneath; towards the base, the margins are somewhat revolute. The petioles are very short, and leave scars on falling off, giving the branches a tuberculated appearance. The flowers are axillary, and supported on a single short peduncle, or on elongated pedicels; they are provided with thick, oblong, pointed bracts.

Fig. 59.

D. winteri.

1. Sepals. 2. Anther. 3. Carpels. 4. A section of a carpel.

The sepals are two or three, of a green colour, thick, coriaceous, and persistent. The corolla consists of seven white, obtuse, concave, erect petals, very caducous. The filaments are numerous, shorter than the petals, and supporting large, oval anthers, longitudinally divided by a deep fissure. The ovary is formed of 4—8 carpels, which is surmounted by a sessile stigma. The fruit is ovate, a thick fleshy berry, which is many-seeded.

This tree is a native of Terra del Fuego and the southern parts of South America. It was discovered in 1579 by Capt. Winter, who commanded a vessel in the squadron under Sir Francis Drake, and from specimens of the bark he brought home, it was described by Clusius (*Exot.* lib. iv. ch. 4), and named in honour of its discoverer. Some years afterwards the same writer also noticed the *Canella alba*, but notwithstanding the differences he points out between them, they were confounded together by almost every writer, until Dr. Solander again described it, as well as the tree from which it is derived, in the fifth volume of Medical Inquiries and Observations, though Sir Hans Sloane had previously given separate accounts of the two in the Transactions of the Royal Society; even Linnæus was led into error, and combined them under the name of *Laurus Winterana*, but afterwards recognised his error, and adopted the genus *Drimys* of Forster, in which he included the Winter's bark tree and other species.

The bark is in quills or rolled pieces of some length, of different widths and thickness, of a pale-yellowish, or dull reddish-gray, with darker spots externally, and of a dark cinnamon colour internally. It has an aromatic smell, especially when bruised, and a warm, pungent, spicy taste, which is very permanent. It has been found to contain resin, volatile oil, tannin, a colouring matter, and several salts. (Henry, *Journ. de Pharm.* v. 489.)

Medical Properties, &c.—This bark is stimulant, aromatic, and tonic, and may be employed in all cases in which the Canella and Cinnamon are indicated. It was much praised by the discoverer as an antiscorbutic. Ferrein states that the natives employ it to prevent a cutaneous disease to which they are subject, from eating seal's flesh. It is now but seldom employed, and has become very scarce in commerce.

There are several other species, as the *D. granatensis* and *D. punctata*, which possess similar qualities, and are used in South America as condiments.

Many other species of this order are endowed with marked properties. The whole plant of *Illicium anisatum*, but especially the fruit, has the aromatic smell and qualities of the anise, for which the oil of the seeds is often substituted in the fabrication of liqueurs. Those of the *I. religiosum* are used as incense in the Chinese temples; our native species, the *I. floridanum*, has similar properties, and the bark may be used as a substitute for cascarilla. That of the *Michelia montana*, although less bitter, is possessed of the same remedial powers, whilst that of the *M. gracilis* contains camphor; the wood of another species of the same genus, the *M. doltsopa*, is much esteemed in Nepaul for house-building (*Don. Prod.* 226). The bark of the *Aromadendron elegans* has great reputation in Java as an antihysteric, carminative, and stomachic, the wood also is valuable for a variety of purposes, and that of the *Manglietia glauca*, a native of the same island, is highly esteemed for coffins, as it is supposed to prevent any decay of the bodies put in them. The bark described by Cadet (*Journ. de Pharm.* 1815), under the name of Melambo, as similar to that of the *Drimys*, was supposed to be derived from a plant of this order, but on insufficient grounds.

Order 3.—ANONACEÆ.—*Richard.*

Flowers large, of a dull brown or greenish colour. Calyx of 3 persistent sepals. Corolla of 6 petals in two rows, coriaceous, with a valvate æstivation. Stamens numerous, rarely definite, with extrorse anthers. Carpels few or numerous, closely united, sometimes cohering, so as to form a fleshy, concrete fruit. Seeds one or more in each carpel, with a brittle testa, attached to the suture; embryo minute, at the base of a hard, ruminate albumen.

This order consists of trees or shrubs, with alternate, entire leaves, without stipules. They are principally found in the tropics, but a few are native more to the northward and southward. The general character of the species is that of being powerfully aromatic and stimulant. None of them are recognised as medicinal, though it is probable from the marked qualities of some of them, that they might be advantageously employed in regular practice, as Blume states that the seeds of some of the species of *Xylopia* must be used with caution, as when employed freely, they cause vertigo, hæmorrhage, and even abortion; and Martius says that the seeds of the *Uvaria febrifuga* or *Frutta de burro* of the Indians on the Orinoco, form an excellent febrifuge. The fruit of the *Monodora myristica* is similar to that of the nutmeg, and may be used as a substitute for it, but is less pungent.

The berries of *Habzelia æthioptica* and *H. aromatica* are aromatic and pungent, and are employed in place of other spices. That of the first is the Ethiopian pepper of commerce.

The succulent fruit of some of the species of *Anona*, *Uvaria*, &c., are edible and agreeable, containing a sugary mucilage; among these are the Custard apples, the Papaw of the United States, and the Cherimoyer of Peru. In some of these plants the wood is very bitter, especially in the *Xylopia glabra*, in which this quality is so marked as to render it unfit for most purposes, and it is said that sugar hogsheads made of it, render the contents uneatable even by cockroaches. The wood of the *Dignetia quitarensis* is much employed by coachmakers, on account of its strength and elasticity, and is well known under the name of Lancewood; and that of another species of the same genus, is stated by Martius to be one of the heaviest yet discovered.

Group II.—Menispermales.

Order 4.—MENISPERMACEÆ.—*Jussieu.*

Flowers diœcious. Sepals mostly in two rows, deciduous. Petals usually equal in number to the sepals, hypogynous. Stamens often monadelphous, sometimes distinct; in number equal to the petals, or 2–4 times as numerous. Anthers adnate. Ovaries many, 1-celled, and with 1 style, distinct or rarely united. Pericarp, a 1-seeded drupe, lunate or incurved. Seed of the same form, with a thin fleshy albumen, and a curved embryo.

The plants of this order are flexible or twining, with alternate leaves, not furnished with stipules, and in most cases small flowers, disposed in racemes or panicles. They are common in the tropical parts of Asia and America, but are seldom found out of these regions; North America contains but six. Their general character is either narcotic or bitter, or both combined. Thus the bark of the *Chondrodendron convolvulaceum* is esteemed as a febrifuge in Peru; whilst the berries of the *Anamirta cocculus* furnish the poisonous principles, picrotoxine and menispermine. The roots and bark of most of the Cocculi are bitter and tonic; and those of the Cissampeli are stimulating diuretics. The root of *Menispermum canadense* is said to be tonic, alterative, and diuretic.—(*Riddell.*)

Cocculus.—*Bauhin.*

Flowers diœcious. Sepals 6, in two rows. Petals 6, distinct. Stamens 6, opposite, free. Ovaries 3–6. Drupes 1–6. Racemes axillary.

This genus, adopted by De Candolle from Bauhin, is very closely allied to Menispermum, differing from it chiefly in the equality in numbers of the stamens and sepals, instead of the former being twice or more than twice as

numerous. The species are found in most of the great divisions of the earth, except Europe, but are most numerous in Asia.

C. PALMATUS, *Lam.*—Leaves cordate, 5–7 lobed; lobes entire, acuminate, somewhat hairy on both sides. Stem and germ, with glandular hairs.

Hooker, *Bot. Mag.* 2970–71. Lindley, *Flor. Med.* 369. Stephenson and Churchill, *Med. Bot.*, iii. 160. *Menispermum palmatum*, Berry, *Asiat. Researches.*, x. 385.

Common Names.—Colomba, Columbo, Calumba.

Foreign Names.—Calombo, *Fr.* Calumba, *It.* Kalumb, *Mozamb.*

Description.—Root perennial, formed of many fleshy, descending tubers, covered with a brown skin, and somewhat rugged at the upper part, internally yellow. Stems annual, twining, simple in male plant, branched in female, with glandular hairs. Leaves alternate, large, deeply cordate, 5 to 7-lobed, dark green above, paler beneath, hirsute. Racemes of flowers in male plants axillary, compound, with small caducous bracts at base; in the female plant, also axillary, simple, shorter than in the male. The calyx is glabrous, of 6 sepals, arranged in a double series. The corolla consists of 6 pale-green petals in a single row. The stamens are 6, with terminal, truncate, 4-celled anthers. The pistils are 3, of which two are often abortive; stigma spreading. The fruit is a berry, about the size of a hazel-nut, covered with long glandular hairs. The seed is somewhat reniform, of a black colour, and transversely striated.

Fig. 60.

C. palmatus.

a Male flowers. *b* Calyx. *c* Stamen. *d* Petal. *e* Bract.

The root of this plant has long been known under the name of Columbo, and it was early ascertained that it was derived from some part of the East Indies, supposed most generally from Ceylon, from the coincidence of its name with that of one of the principal towns in that island. Thunberg, in his travels, first asserted that this was not the case, but that it came from the coast of Malabar. Commerson, during a residence in the Isle of France, gathered some specimens of a plant, which he designated as "Columbo in Indiis vocatum." These were described by Lamarck under the name of *Menispermum palmatum*, and he further suggested that it might be the true Columbo. There the matter rested until 1805, when a M. Fortin brought from Mozambique to Madras a fresh root, which being planted, produced a male plant, from which the description of Dr. Berry was made.

Still the female flower and fruit were unknown until 1820, when Dr. Hooker was enabled to describe both sexes, from information and drawings received from Mr. Telfair, of the Mauritius.

From the accounts of this gentleman, and of M. Fortin, it appears that it grows abundantly in the forests of Mozambique, where it is known under the name of *Kalumb*. The roots are dug during the dry season, and only the offsets taken, as the main root is too fibrous; they are sliced, strung on cords, and dried in the sun. It is deemed good when it breaks short, and of a bad quality when it is soft and dark-coloured. The plant has been successfully cultivated in the Mauritius and Isle of Bourbon, as well as in other parts of the East.

Medical Uses, &c.—Columbo, as found in the shops, is in round pieces, about a quarter of an inch thick, externally of a brown, wrinkled appearance, and internally yellow. When good, it breaks with a starchy fracture, is bright and solid, somewhat aromatic, and very bitter. It is very liable to decay and to attacks of worms. It is said to be adulterated in the European markets with roots of some species of Bryony from Barbary, and also with those of the Frasera from the United States. Both falsifications are readily to be detected; the first, by not striking a blue colour with iodine, and the latter by giving no precipitate with the infusion of galls.

Columbo is an excellent bitter tonic, as it is free from any unpleasant taste, and generally agrees well with the stomach. It may be employed with advantage where the digestive functions are weakened, and in the convalescent stages of most of the acute disorders of the bowels. From its slight exciting powers, it has been found useful in hectic fever, and Denman recommends it as preferable to Cinchona in the low stage of puerperal fever. In its native country it is much employed in the treatment of dysentery. It is usually given in the form of infusion, which should be used at once, as it is very liable to spoil. It may be combined with the aromatics, or with iron and the alkalies. The officinal preparations of the United States Pharmacopœia are the infusion and tincture.

From the analysis of M. Planche, this root is found to contain a peculiar azotized substance in large quantities, a bitter yellow substance, and much starch. This bitter yellow substance is considered by Wittstock, of Berlin, to be a peculiar principle, which he terms Colombin. It exists, however, in too small proportions to be the sole medicinal principle in the root, as but one drachm was furnished by sixteen ounces of the root. (*Journ. Phil. Coll. Pharm.*, iii. 173.)

Some other species of Cocculus possess analogous properties to the Columbo, though it is difficult, in the present state of confusion that exists in the species of this genus and that of *Menispermum*, to speak with absolute confidence, or to say to which they absolutely belong. Among these may be noticed the *C. crispus*, De C., (*M. tuberculatum*, Lam., and *M. verrucosum*, Rox.) The extract from the root is employed in India as a tonic in intermittent fevers and in the convalescent stage of dysentery and other diseases of the bowels, in doses of five or ten grains. Ainslie, in his Materia Indica, states that every part of this plant is extremely bitter, but particularly the stalk, and is much used among the Malays in the treatment of intermittent fever, and is esteemed as powerful as Peruvian Bark. Wight states that the *C. cordifolius*, De C., is equally active, and that its young shoots are powerfully emetic. Under the name of Gulancha, it is much used in Bengal, in febrile disorders, especially of a low type. *C. bakis* has a bitter and diuretic root, which is used by the negroes of Senegal in diseases of the urinary passages, and also in the treatment of intermittent fever. (*Guillem and*

Perrot, Fl. Sen., i. 12.) The root of *C. fibraurea*, De C., has the same properties, and, according to Loureiro, is used in fevers and liver complaints (*Fl. Cochin.* 769). Those of *C. cinerascens* and *C. platyphyllus* are known in Brazil, under the name of "Butua," and are much esteemed in fevers and chronic affections of the digestive organs. (*Chernoviz. Formul.*, 74.)

Anamirta.—*Colebrooke.*

Flowers diœcious. Sepals in two series. Corolla none. Stamens of male plant united; anthers numerous. Female flowers unknown. Drupes 1–3, one-celled, 1-seeded.

Much uncertainty and doubt has existed as regards this genus. Linnæus referred the only species known, to *Menispermum;* this, with others, was separated by De Candolle, and erected into that of Cocculus, and finally it has been made by Colebrooke the type of Anamirta.

A. cocculus, *Wight and Arnott.*—The only species.

Wight & Arnott, i. 446; *Menispermum cocculus*, Linn. *Sp. Pl.* i. 468; Willdenow, *Sp. Pl.* iv. 829; *A. paniculata*, Colebrooke. *Linn. Trans.* xiii. 52.

Common name.—Cocculus Indicus.

Foreign names.—Coque du Levant, *Fr.;* Galli di Levante, *It.;* Fischkörner, *Ger.*

Description.—A very large climbing shrub, with stems as thick as the human arm, covered with a scabrous, wrinkled, corky bark. The leaves are cordate, retuse, mucronate, with a jagged petiole, shorter than the leaves. The flowers are in lateral compound, racemes, and have an unpleasant smell. They are diœcious, and only the male is known; this consists of six sepals in a double row, with two appressed bracts. The corolla is wanting. The stamens are united in a central column, dilated at the apex; the anthers are numerous, covering the top of the column. The fruit is a drupe, which is one-celled and one-seeded, of a blackish-purple colour, with a soft pulp, and a round seed or nut.

This plant is found in various parts of Asia, and has long been known for the narcotic properties of its berries, which, besides being used for medicinal purposes, are employed to intoxicate fish. It was probably introduced into the Materia Medica by the Arabians, but there is no certainty on the subject, though the fact of its having been in use for ages in India and other Eastern countries for the above purposes, renders the supposition that we are indebted to this source for a knowledge of it, highly probable.

The parts used are the berries; these are round, somewhat subreniform, inodorous, of a grayish-black colour, about as large as a pea, and composed of an external, thin, hard, brittle shell, covering another which is white and still denser, and contains a white nucleus divided by a central placenta. They are very bitter to the taste. Many analyses have been made of them, the last of which was by Pelletier and Couerbe. (*Ann. de Chimie, &c.*) These chemists found in the shell, Menispermin, Paramenispermin, Hypopicrotoxic acid and various vegetable matters; in the nucleus Picrotoxin, Resin, Gum, a fatty acid substance, an odorous matter, &c. The most important of these is the Picrotoxin, on which the activity of the seeds depends.

Medical properties, &c.—Cocculus Indicus is poisonous to all animals, acting on the cerebro-spinal system and causing nervous tremors, convulsions and tetanus; it also acts on the stomach as a local irritant. It is rarely employed as a remedial agent, but has been used externally in form of powder or ointment, in some obstinate cutaneous affections, and for the destruction of

vermin. The principal consumption of these seeds is for the purpose of adulterating malt liquors to make them more inebriating; whether this dangerous fraud is practised in this country there is no direct evidence, but that it is common in England, and to a very great extent, is generally admitted. In a treatise on brewing, by Morrice, he states that it gives an inebriating quality which passes for strength of liquor, and prevents a second fermentation in bottled beer, and consequently the bursting of bottles in a warm climate.

The root is used in India in many diseases of the bowels, and is highly esteemed, the branches are said to afford a rich yellow dye.

Several other plants are said to furnish seeds possessed of much the same qualities as those of the *Anamirta;* among these the *Cocculus lacunosus* and *C. plukenetii* are noticed by Merat and De Lens, but whether they belong to *Anamirta* or *Cocculus* has not been determined.

Cissampelos.—*Linn.*

Flowers diœcious. Sterile flowers, sepals 4 in a double series; petals 4, united into a cup-shaped corolla. Stamens 5, anthers connate. Fertile flowers. Sepal 1, rounded; petal 1. Fruit a 1-seeded berry.

This genus as instituted by Linnæus, contained a number of species possessed of very dissimilar characters, but is now very greatly restricted, though it still requires much investigation, as the limits of the several species are by no means settled in a satisfactory manner. They are all natives of tropical climates, and are found both in Asia and South America, but principally in the latter.

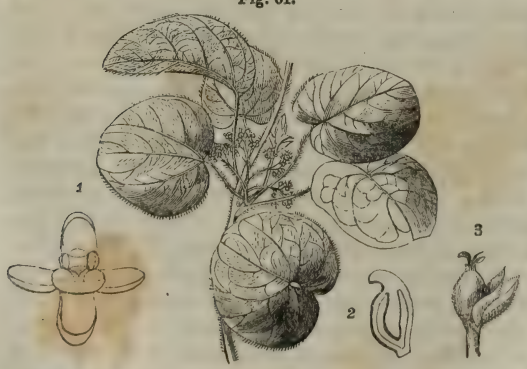
C. pareira, *Linn.*—Leaves peltate, orbicular, cordate, villous; sterile flowers racemose; fertile flowers spicate longer than the leaves.

Linn., *Sp. Pl.* 1473; De Candolle, *Prod.* i. 533; *Flor. Medicale*, v. 262; Woodville, t. 82; Lindley, *Flor. Med.* 372.

Common names.—Velvet leaf, Ice vine.

Foreign names.—Pareira brava, *Fr. Sp.;* Grieswurzel, *Ger.*

Fig. 61.



C. pareira.
1. Separate flowers. 2. Embryo. 3. Calyx.

Description.—The velvet-leaf is a climbing shrub, attaining a great size and covering even the tallest trees with its foliage. The root is woody and branching. The stem is round, smooth, or with a closely-appressed tomentum. The leaves are large, peltate, subcordate, ovate articulate, of a dark green, and smooth above and silky pubescent beneath. The flowers are unisexual; the males with four sepals in a double range, and four petals forming a cup-like corolla, with an entire margin. The stamens are united, bearing connate anthers opening horizontally. The female flowers have but a single sepal and petal. The ovary is solitary, surmounted with three stigmas. The fruit is a round, or reniform, hispid, scarlet berry.

Fig. 62.

C. pareira.

1. Raceme of flowers. 2. Separate raceme. 3. Section of ovary.

It is known in Jamaica, where it grows in abundance in the mountainous districts, by the name of Velvet-leaf. It also occurs in several other of the West India islands, and in South America. It is also spoken of by Ainslie as a native of the East Indies, but it appears that the plant to which he refers is *C. mauritiana*, which is closely allied both in botanical characters and in medicinal qualities.

The part used in medicine is the root, which, as found in commerce, is generally in large billets, very tortuous, of a dark colour externally, and of a yellowish hue within. The axis is not central, and a section displays a number of concentric layers, traversed by many radiating lines, between which are triangular bundles of woody fibres and ducts. The taste is sweetish, somewhat aromatic, but leaving a bitter and unpleasant impression in the mouth. The smell is very faint.

The first notice given of this root was by Piso, who mentions that a root was employed by the natives of Brazil, under the name of *Caapeba*, in certain diseases of the bowels and urinary organs; this plant was erected into a species by Linnæus with the appellation of *Cissampelos Caapeba*, and may be distinct from the *C. pareira*, though it appears probable that it is at most a mere variety of it. In fact, Merat and De Lens state that there is every reason to believe that the *C. guayaquilensis* and *C. argentea*, Humboldt, as well as the *C. microcarpa*, De Candolle, are identical with it; as before mentioned, the Pareira of Ainslie is the product of another species, and that of Aublet, is said to belong to another genus, *Abuta*, but nothing is known with certainty with regard to it. The genuine article is the product of the *C. pareira*, as this is certainly the root spoken of by Sloane and others.

Pareira has been analyzed by Fenuelle, and more recently by Wiggers. The first found a soft resin, a yellow bitter principle, which is the active ingredient, a brown colouring principle, vegeto-animal matter, fecula, some salts, &c. Wiggers states that he has detected a new vegetable alkaloid in it, which he calls *Cissampelin*, but its properties have not been described.

Medical Properties, &c.—Pareira was introduced into medical practice by the Portuguese, and at one time was much employed in diseases of the bladder and kidneys, and even considered as a powerful lithontriptic; its virtues were at one time so highly thought of, that Helvetius declares that calculi of a large size had completely disappeared under its use, and that the operation of lithotomy was no longer required; but from one of those unaccountable changes in the opinions of the medical world, which have so often occurred without any adequate reason for them, it rapidly sunk into almost perfect oblivion, till within a few years since it again began to attract the attention of the profession, and it has been shown to possess most unequivocal powers in certain affections of the bladder. Sir B. Brodie, who was one of the first to resume its use, states that he has seen more good effected by this root in discharges from the urino-genital organs, than by uva ursi. In chronic inflammations of the bladder, he says, "I am satisfied that it has great influence, lessening very materially the secretion of the ropy mucus, which is itself a very great

evil, and I believe, diminishing the inflammation and irritability of the bladder itself." He recommends it to be given in decoction, to which some tincture of hyoscyamus may be added.

It is given in powder, in doses of from half a drachm to a drachm, but the infusion or decoction is a far more eligible mode of administration. An extract and a tincture have also been prepared from it.

The leaves of the *C. mauritiana* are used in India as being very cooling, and the root, in diseases of the bowels, in combination with aromatics; and those of the *C. tomentosa* are employed in Venezuela as a poultice to maturate abscesses. The Brazilians use the roots of the *C. glaberrima* as a remedy for snake-bites, and Royle states that in India, an intoxicating liquor is distilled from the roots of the *C. obtecta;* that of *C. glabra* is extremely acrid. (*Roxb.*)

Besides these, other plants of the order are medicinal, thus, *Pereiria medica* (*Lindl.*), a climbing shrub found in Ceylon, furnishes a large bitter root, which is considered by the Cingalese to be an excellent stomachic; it is used in infusion (*Roxburgh, Fl. Ind.* iii. 809). The root of *Clypea burmanni* is employed in Malabar in fevers, bowel diseases, and hæmorrhoids. As before stated, one kind of Pareira brava is the product of *Abuta rufescens;* this is similar in its effects to the genuine.

Order 5.—MYRISTICACEÆ.—*Lindley.*

Leaves alternate, exstipulate, not dotted, entire, petiolate, coriaceous. Flowers in axillary or terminal racemes or panicles; very small, often each with one short, cucullate bract. Calyx coriaceous, usually tomentose outside; trifid or rarely quadrifid, with a valvate æstivation. Unisexual; male flowers with the filaments separate or united in a cylinder. Anthers 3–12 or more, extrorse, with a longitudinal dehiscence; connate or distinct. Female; calyx deciduous; carpels solitary or many, with a single erect anatropal ovule; style very short; stigma somewhat lobed. Fruit baccate. Albumen ruminate, between fatty and fleshy. Embryo small, cotyledons diverging. Radicle inferior.

A small order of tropical trees often furnishing a red juice; most common to Asia. The bark abounds in an acrid, viscid juice, and the rind of the fruit is caustic. The fruit of most of the species of *Myristica* are aromatic, and yield a fatty oil on expression, which is also the case with that of *Virola.* The red juice of some of them is used as a substitute for dragon's blood, and that afforded by the mace of *Pyrrhosa tingens* is used in Amboyna in union with lime, to stain the teeth. (*Blume.*)

Much difference of opinion exists respecting the station this order should occupy; in general it is placed near the Lauraceæ, on account of its apetalous flowers, but it differs from them in many important particulars. From its alliance with the Anonaceæ through *Hyalostemma* and *Bocagea*, in its trimerous flowers, ruminate albumen, and arillate seed, it may be placed near that order with more propriety. I have, however, followed Lindley in arranging it in the same group as the Menispermaceæ, on account of its unisexual flowers, more especially as it agrees with the Monimiaceæ in its diverging cotyledons, and is connected with Menispermaceæ through *Anomospermum*, which has a ruminated albumen.

Myristica.—*Linn.*

Flowers diœcious. Calyx urceolate, three-toothed. Male, stamens united into a columnar tube; anthers 6–10, cohering. Female, ovary simple, style none, stigma two-lobed. Pericarp fleshy, two-valved, 1-seeded. Seed enclosed in a coriaceous, many-cleft arillus.

This genus, of about eight species, was established by Linnæus on the im-

perfect figure and confused description of Rumphius (*Herb. Amb.* ii. 14, t. 4), and he was unable to assign it its proper characters; these were first given in a satisfactory manner by Lamarck (*Act. Par.* 1788). It is principally Asiatic, though some species also occur in tropical America, and in Africa; they all are aromatic and stimulant, though one only is in general use.

M. MOSCHATA, *Thunberg.*—Leaves elliptic-oblong, acuminate, smooth, paler beneath, with simple veins. Peduncles few-flowered.

Thunberg, *Act. Holm.* 1782; Woodville, iv. t. 238; *Bot. Mag.* t. 2756, 2757; Stephenson & Churchill, ii. 104; *M. officinalis*, Linn. *Suppl.* 265; Lindley, *Flor. Med.* 21; *M. aromatica*, Lam. *Illus.* t. 832.

Common name.—Nutmeg tree.

Foreign names.—Muscadier, *Fr.* Moscato, *It.* Muskatbaum, *Ger.* Pela, *Malay.*

Description.—A tree from twenty to twenty-five feet high, having a grayish-brown, and somewhat smooth bark, abounding in a yellow juice, and furnished with many whorls of spreading branches. The leaves, which are alternate, on short petioles, are oblong, pointed, smooth, entire, of a dark-green, and somewhat shining above, and paler beneath, with simple parallel veins, and when bruised, are aromatic. The flowers are in axillary racemes, and are supported on glabrous peduncles, each pedicel having a deciduous bract at the summit. The male flowers are from three to five on a peduncle. The calyx is urceolate and petaloid, of a fleshy texture, and somewhat tomentose externally, of a pale-yellowish colour, and three-cleft. The stamens are united into a cylindrical column, bearing six to ten connate, linear-oblong, two-celled anthers, with a longitudinal dehiscence. The female flowers are frequently solitary, having a short style, borne on a broadly-ovate germ, and terminating in a two-lobed persistent stigma. The fruit is pyriform, pendent, having a fleshy pericarp opening by two nearly longitudinal valves, and abounding in an astringent juice. The arillus (mace) is fleshy, much laciniated, almost enveloping the nut, of a brilliant scarlet colour when fresh, but of a yellow-brown and brittle when dry. The nut is oval, with a hard, rugged, dark-brown, shining shell, marked by the mace. It closely envelopes the seed, and its inner coat dips down into the substance of its albumen, giving it a marbled (*ruminated*) appearance. The seed when fresh is quite smooth, but shrivels on drying; its substance or albumen is fleshy

Fig. 63.

M. moschata.

1. Calyx and stamens. 2. Stamens. 3. Anthers. 4. Female flower. 5. Nut. 6. Seed divided. 7. Embryo.

and whitish, but traversed by veins of a red-brown colour, abounding in oil. Near its base is the large, fleshy embryo, and the hemispherical radicle.

The nutmeg-tree is said by Rumphius to resemble the pear-tree in size and appearance, and to bear fruit at the age of ten years, and to become more prolific as it increases in growth, until it has attained a longevity of a hundred years. It is principally found in the Moluccas, and especially in the Banda Isles, to which the Dutch have endeavoured to restrain its growth. Of late years according to Ainslie it has been cultivated in Java, Sumatra; and has also been introduced into the West Indies.

The nutmeg does not appear to have been known to the Greeks or Romans, though some writers have supposed it to be the κωμακον of Theophrastus, the *cinnamum, quod comacum appellant* of Pliny. (*Lib.* xii. *c.* 63.) It was, however, in use in Egypt, since fragments of the nut have been found in mummies. The first definite notice of it is by Avicenna (*lib.* ii. *c.* 503), who terms it *Jiansiban*, and it is also mentioned by Serapion under the name of *Jusbagme*. It was brought in small quantities to Europe by the caravans, but was not in general use as a condiment until after the discovery of the passage to India, round the Cape of Good Hope, and especially since the conquest of the Banda Isles by the Dutch in 1612, since which the consumption has been immense. In the year 1746 the annual produce was 163,000lbs. of nutmegs, and 46,000lbs. of mace; between the years 1796 and 1798, the imports into England by the East India Company was 93,732lbs. of nutmegs, and 46,730lbs. of mace, and about a third more by private individuals. In 1840, it is stated by Pereira (ii. 266), that 114,160lbs. of nutmegs and 16,333lbs. of mace were entered at the English custom-houses. The average crop is considered to be 350,500lbs. of nutmegs, of which 250,000lbs. are exported; and 100,000lbs. of mace, 90,000 of which are sent abroad. Crawford states if a fruit weigh 15, the mace will be 2, the shell 5, and the nutmeg 8.

In the East Indies the trees are almost always loaded with both fruit and flowers, and three gatherings are made: in July and August, when the fruit is most abundant, but the mace is thinner than in November, when the second collection is made; the third and principal harvest is in March, when the nuts, as well as the mace, are in the greatest perfection. The fruit is gathered by hand, and is never used in its entire form, on account of its acridity, except in its young state, when by boiling it with brandy and sugar, it forms a pleasant sweetmeat. The outer pulpy coat is removed with a knife, and thrown away; the mace is then carefully separated and dried in the sun, sprinkled with sea-water and again partially dried; in this process it changes from its original crimson colour to a brownish yellow. The nutmegs require more attention, as they are liable to the attacks of an insect; they are first exposed to the sun for a few days, and then slowly dried by a slow fire for a length of time, until the seed becomes perfectly detached from the shell, this is then broken and the seeds soaked in lime-water, which not only protects them from the insect, but also prevents the volatilization of the aroma.

Nutmegs should be chosen heavy, firm, of the shape of an olive, of a lightish-brown on the outside, and of a reddish-gray with red veins internally, of an agreeable fragrant odour, warm aromatic taste, and unctuous feel. The round nutmeg is preferred to the oblong. When distilled with water, they furnish an essential oil of a viscid consistence, of a pale straw-colour, with the odour and taste of the seed. By expression, a fatty substance is obtained, known as "butter of nutmegs," of about the consistence of spermaceti, of a yellowish-brown colour, and having an agreeable smell, and a fatty, pungent, bitterish taste. Bonastre (*Jour. de Pharm.* ix. 281) found that

500 parts of nutmegs consisted of: stearine 120, elaine 38, volatile oil 30, acid 4, starch 12, woody fibre, gum, &c., 296.

Mace, as found in commerce, when fresh and good, is of a reddish-brown or saffron colour, of a pleasant aromatic smell, of a warm, bitterish, pungent taste, and a tough oleaginous texture. On distillation, it affords an essential oil, having the odour and flavour of the mace. According to an analysis by Henry, (*Jour. de Pharm.* x. 281,) mace contains a small quantity of volatile oil, much odorous, fixed oil of a yellow colour, about an equal portion of a red, fixed, fragrant oil, a peculiar extractive, and a small proportion of woody fibre.

Medical Uses, &c.—The great employment of the nutmeg and mace is for culinary purposes, as condiments, for which purpose they are admirably adapted from their agreeable taste and their stimulating properties. In the East, they are in general use both by the natives and Europeans, as the most energetic of the digestive excitants, as well as to impart a flavour to insipid articles of food. As remedial agents, they owe their activity to the volatile oil they contain, and when administered in moderate quantities, produce the usual effect of the other spices, but in large doses they cause an unpleasant train of narcotic symptoms, not unlike those induced by an undue use of camphor; instances of this are noticed by Bontius, Lobel, Etmuller, Ainslie, Cullen, Pereira, and others, and hence they should be avoided in cerebral affections. In India they are considered among their most valuable remedies in dyspeptic complaints, and in all cases requiring cardiacs and corroborants, and are also prescribed to children suffering much in weaning: they are likewise given in low fevers, consumptive complaints, and asthma, generally in combination with other aromatics.

In Europe and the United States they are seldom employed except as condiments, their principal use in medicine being as a flavouring ingredient, or to obviate the drastic effects of certain purgatives, though from their cordial, carminative and narcotic powers they have produced good effects in bowel complaints. Nutmeg forms an important ingredient in the aromatic confection so frequently used in these diseases, and also entered into the composition of numerous electuaries at one time so much prized, as the theriac, orvietan, &c.

The volatile and expressed oils are occasionally resorted to as external stimulants in rheumatism and palsy, but are inferior to many other articles of the same character. The dose of either nutmeg or mace is from a few grains to a scruple, or even more, according to circumstances; habit reconciles the constitution to much larger doses than can be borne by persons unaccustomed to the use of these articles. The volatile oil may be administered either on sugar, or dissolved in spirit, in doses of two to ten drops.

Several other species of Myristica furnish analogous products, though none of them are equal to those of the *moschata*. The *M. tomentosa* of southern India is said to afford what are called *long* or *male* nutmegs, which, although possessing the same qualities as the genuine article, are much inferior to them in flavour; the fruit of the *M. officinalis* Spix is considered in Brazil as an energetic tonic; and in the East Indies the fruit of the *M. spuria* and *M. acuminata* are used as substitutes for the true nutmeg. The coarse, unpleasant-smelling nutmegs of Santa Fe are the produce of the *M. otoba*; the mace of this is the basis of an ointment used in Colombia as a remedy in the itch. Some of the species have insipid nuts; thus in the *M. fatua*, the fragrance is very slight and soon disappears, whilst in others it is scarcely perceptible; but at the same time the nuts are still active, as Mr. Hinds (*Lond. Jour. Bot.*

i. 675) states that a single one is capable of causing nausea and disturbance of the bowels.

Group III.—Berberales.

Order 6.—BERBERIDACEÆ.—*Brown.*

Sepals deciduous, 3—6 in two rows. Petals hypogynous, equal in number to the sepals, or twice as many, glandular at base. Stamens as many or twice as many as the petals, and opposite to them. Filaments short. Anthers adnate, opening by recurved valves. Ovary solitary, simple. Style sometimes lateral or oblique, sometimes wanting. Stigma orbicular or peltate. Fruit baccate or capsular. Seeds 1 or few. Embryo in the axis or near the base of the fleshy or horny albumen.

The species of this order are natives of the temperate parts of the northern hemisphere, and of the mountainous parts of South America; none are found in Africa, Australasia, or the South Sea islands. The physical properties of them are various, though it may be said that their fruit is generally acid, and somewhat astringent, and their bark astringent and tinctorial. The roots of some of them are edible, whilst in others they are cathartic. The seeds of *Leontice thalictroides* have been used as a substitute for coffee, whilst the root of the *L. leontopetalum* is employed at Aleppo instead of soap, and is regarded by the Turks as an antidote against over-doses of opium.

Berberis.—*Linn.*

Sepals 6, with 3 bracts. Petals 6, bi-glandular at base. Stamens 6. Stigma nearly sessile, orbicular. Fruit a 1-celled, 1—9-seeded berry.

The genus Berberis is composed of shrubs, with alternate, petiolate leaves, having spines at their base, formed of the remains of the primary foliage. Many of the species, especially those belonging to the sub-genus or section *Mahonia* are evergreen. They are mostly natives of cold or temperate climates.

B. vulgaris.—*Linn.* Branches dotted, with triple spines. Leaves obovate-oval, closely serrulate. Racemes nodding, many-flowered. Berries oblong.

Linn. *Sp. Pl.* 472; Torrey and Gray, *Fl.* i. 49; Richard. ii. 617; Rafinesque, *Med. Fl.* i. 82; Lindley, *Veg. King.* 437 f. 305; *Flor. Med.* 63.

Common name.—Barberry.

Foreign names.—Epine Vinette, *Fr.*; Berberitze, *Gr.*; Berberi, *It.*

Description.—A shrub from four to eight feet high, with long bending branches, which are dotted. The leaves are crowded, and form fan-like groups; they are alternate, petiolate, and closely serrate; at their base are small thorns, which are a transformation of the primary leaves. The flowers are on slender and pendulous racemes; they are yellow and small; they are succeeded by loose bunches of berries, of an oblong form and red colour, of a pleasant acid taste.

The Barberry is a native of Europe, but is naturalized in many parts of the United States, especially in New England. Some confusion has existed among botanists, respecting the American plant, some considering it as a variety of, or even distinct from, the European, mistaking it for the plant originally indicated by Marshall as found in Virginia, and described by Pursh, under the erroneous name of *Canadensis*, as it has not been found in that country, being confined to the Southern States. In consequence, however, of the habitat he assigned to it, most of our botanists have considered that he had in view the naturalized plant, and hence this is generally separated from the

vulgaris under Pursh's name. Rafinesque, in his Medical Flora, has fallen into this error, and has described and figured the foreign species as the true *Canadensis*. The distinctions between the two are ably pointed out by Torrey and Gray, founded on original specimens collected by Pursh.

The stamina are exceedingly irritable, and like those of the Kalmia suddenly spring towards the pistil on being touched. The smell of the flowers is unpleasant and nauseous, and it is a common belief that the dust or pollen from them is injurious to wheat, causing rust; this opinion has been defended in an able memoir by Mr. Yvart, but notwithstanding the ingenuity of his arguments, nothing can be more unfounded, as the most ample and well-conducted experiments have shown.

Fig. 64.

B. Vulgaris.

1. Flower. 2. Calyx. 3. Petal and stamen. 4. A single stamen. 5. Section of ovary. 6. A ripe seed. 7. Section of do. 8. Embryo.

Medical uses, &c.—The berries are used in Europe in the preparation of acidulated drinks in febrile affections, as a substitute for Tamarinds and other acid fruits. The bark, especially of the root, is bitter and astringent, and has been used with some success in the treatment of aphthous sore mouth, and at one time was much employed in the treatment of jaundice. It has also been substituted for the bark of the Pomegranate, with which it has scarcely a property in common.

From an analysis by MM. Buchner and Herberger, it is shown that this root contains a new principle, which they call Berberine, of a yellow or brownish colour, and very bitter taste. This article acts like Rhubarb, and with equal promptness and activity.

Another species, *B. lycium*, a native of India, is stated by Royle (*Illustr.* 64), to be useful in ophthalmia. An extract is made from the root and branches, and is called "rusot." It is most beneficial when the acute symptoms have been removed.

Leontice.—*Linn.*

Sepals 3-6. Petals 6, furnished with a small scale or nectary at the inner base. Carpel membranaceous, caducous or inflated, 2-4 seeded. Seeds erect, globose. Albumen horny.

A small genus which has been variously divided, the American species having been separated by Michaux under the name of *Caulophyllum*, in which he is followed by many botanists, but it may without confusion be considered merely as a section, which is the view taken of it by Torrey and Gray.

L. THALICTROIDES, *Linn.*—Leaves triternate; leaflets incisely 2-3 lobed. Panicle small, shorter than the leaves.

Brown, *Linn. Trans.* xii. 145, t. 7; Mich. *Fl.* i. 305, t. 21; Torrey & Gray, *Fl.* i. 52; Rafinesque, *Med. Fl.* i. 97, t. 19.

Common names.—Blue cohosh, Papoose-root, Squaw-root, &c.

Fig. 65.

L. thalictroides.

This plant is a native of most hilly woods of the United States, flowering in May and June, and ripens its seeds the latter part of the summer. The fruit is dry, sweetish, insipid, and resembles that of the Vaccinium. The seeds when roasted, are said to form an excellent substitute for coffee. The part used in medicine is the root. This is sweetish, somewhat pungent and aromatic, affording a yellow infusion or tincture. No chemical investigation of it has been made.

Medical uses, &c.—It is unknown in regular practice, but has been much used by empirics, who are said to have derived a knowledge of its powers from the Indians. It is stated to be demulcent, antispasmodic, and emmenagogue, and has been administered in rheumatism, dropsy, nervous disorders, &c. Rafinesque states that it is particularly adapted for female disorders, and that the Indian women make use of a tea of the root for some time before their confinement, asserting that it facilitates parturition. It is likewise said to be an active emmenagogue. Riddell (*Synop.* 14) also says that it is "bitter, diuretic, and a preparatory parturient."

Although our information respecting it is very imperfect, it was thought

best to notice it, in the hope that a fair trial may be made of its powers, and whether it deserves the popular reputation it has acquired.

PODOPHYLLUM.—*Linn.*

Sepals 3, deciduous. Petals 6-9, obovate. Stamens 6-18, with linear anthers. Ovary ovate, subsessile, peltate. Fruit fleshy, indehiscent, containing numerous seeds in several rows, in a pulpy placenta.

Although this genus differs from the Berberidaceæ in having more numerous stamens, and in the absence of the peculiar dehiscence of the anthers, still it is so closely allied in other respects, that it seems advisable to leave it in this order, rather than to consider it as the type of a new one, though this has been done by several very eminent botanists. Lindley, who places it in the Ranunculaceæ, is of opinion that it forms a link between that order and the present. It is mainly North American, and was thought to consist of but one species, though Rafinesque recognises three, the *P. peltatum*, *montanum*, and *callicarpum ;* the latter is considered by Torrey and Gray to be a mere variety of the first, and this is probably the case ; the *montanum*, however, judging from Rafinesque's description and plate, presents many differential characters, especially in having palmate but not peltate leaves. Other species have lately been found in Northern India, one of which has but six stamens.

P. PELTATUM, *Linn.*—Stem 1-flowered ; leaves peltate-palmate ; lobes cuneate, incised. Stamens 12-18.

Linn. *Sp. Pl.* 722 ; Torrey & Gray, *Flor.* i. 54 ; Bigelow, *Med. Bot.* i. 35 ; Barton, *Veg. Mat. Med.* ii. 9 ; Rafinesque, *Med. Flor.* ii. 59.

Common names.—May-apple, Wild Lemon, Mandrake, Raccoon berry, &c.

Description.—The root is creeping, long, of a brown colour externally, and yellowish within ; the stem is simple, upright, and smooth, about a foot in height, two-leaved, and bearing a single flower at the insertion of the petioles. The leaves are large, peltate, and divided into five or six lobes, which are incised at top ; they are of a yellowish-green above, and somewhat glaucous beneath. The flower is nodding, large, white, and somewhat fragrant, and is succeeded by an oval fruit, of a lemon-yellow colour, containing a thick, somewhat mucilaginous pulp, in which the seeds are immersed, all connected to the lateral receptacle by fibres.

The May apple is found in great plenty in almost all parts of the United States, in damp and shady woods, though occasionally to be met with in dry and exposed situations. It flowers in May and June, and ripens its fruit in September, at which time the leaves wither and fall off. The fruit is edible, and is very agreeable to some persons, whilst to others it is extremely unpleasant ; it very closely resembles in taste and even appearance, the fruit of the *Passiflora edulis* of the West Indies. It is slightly aperient, and may be partaken of in large quantities, without any unpleasant effect. The Indians are very fond of it, and consider it medicinal. The leaves are said to be narcotic and poisonous, but no experiments have been made to ascertain their true qualities. The root has long been known and celebrated as a cathartic of considerable activity.

Medical uses, &c.—The root of this plant was in common use among the Indians, before the settlement of the country by the whites, and was considered by them as one of their most powerful purgatives. The first writers on the Materia Medica that noticed it, as Schoepf and Puihn, speak of it as an emetic, but except used in too fresh a state or in large

doses, it will not affect the stomach more than any other active purgative. The concurrent testimony of all practitioners who have given a fair trial to the Podophyllum, is in its favour, as a certain and active purgative, closely resembling jalap in its action upon the bowels, but rather more drastic. It induces watery stools, more especially when given in conjunction with cremor tartar. It is also said to be an anthelmintic, and to be used for that purpose among the southern Indians, but this power is probably owing merely to its purgative qualities, and not to any peculiar action on the worms. The dose of the powdered root is from ten grains to a scruple. An extract which is officinal in the U. S. Pharmacopœia may be prepared from it, the dose of which is from five to fifteen grains.

Fig. 66.

P. peltatum.

As found in the shops, the root is in pieces of various lengths, about the thickness of quills, of a blackish-brown colour externally, and somewhat corrugated, with occasional knots; internally it is of a dirty white. It has a faint, unpleasant odour, somewhat resembling that of ipecacuanha, and a bitterish, and at the same time sweetish taste.

This root has been examined by Dr. Staples, and also by Mr. Hodgson; the first detected in it, besides the usual constituents, a peculiar substance which crystallized in white silky tufts; this was not found by Mr. Hodgson, and was probably a salt of lime. The latter pharmaceutist obtained a peculiar principle which he terms *Podophylline*, which evidently belongs to the same group as Salicine and Populine. When dry, it is in pale brown scales of considerable lustre, is unalterable in the air, and has a permanent, bitter taste. The peculiar properties of the root are probably due both to this principle and to the resin.

The *P. montanum* described and figured by Rafinesque (*Med. Flor.* ii. 59, f. 73), seems to differ from the above in having a slender, furrowed stem, the leaves with sharp, bifid segments, and not peltate. Torrey and Gray do not notice this species in their "Flora of North America," in any way. As Rafinesque states that it is equally possessed of medical qualities with the *P. peltatum*, I have added a copy of his description and figure.

"*P. montanum*, Raf. Stem elongated, deeply furrowed; leaves palmate, not peltate, sinuses narrow, segments unequal, ends acutely bifid, with many unequal teeth; petals oblong, obtuse, six to seven; stamens seven to nine, berry oblong, yellowish. In the Alleghany mountains, from New York to Virginia; variety, 1. *acuminatum*; 2. *parviflorum*."

Fig. 67.

P. montanum.

Order 7.—FUMARIACEÆ.—*Decandolle.*

Leaves generally alternate, multifid, often with tendrils. Flowers purple, white, or yellow. Sepals 2, caducous. Petals 4, cristate, very irregular. Stamens 4, distinct, hypogynous, or 6, in 2 parcels, opposite the outer petals, very seldom all separate; anthers membranous, the outer of each parcel 1-celled, the middle one 2-celled. Ovary free, 1-celled; ovules horizontal, amphitropal; style filiform; stigma with two or more points. Fruit various; either an indehiscent 1 or 2-seeded nut, or a 2-valved or succulent indehiscent, polyspermous pod. Seeds horizontal, shining, crested. Albumen fleshy. Embryo minute, out of the axis; where the fruit is indehiscent straight, where it dehisces, somewhat curved.

A somewhat extensive order of herbaceous plants, with bitter stems and a watery juice, principally occurring in the temperate latitudes of northern climates. It has usually been placed in the vicinity of Papaveraceæ, and by

some writers considered as forming part of that order; but as is observed by De Candolle, it differs in the juice being watery instead of milky, in the irregularity and coherence of the petals, and in its diadelphous stamens. It is certainly closely allied to the Berberidaceæ, and its place seems to be intermediate between these two orders.

Many of the species have attained some celebrity as medicinal agents, but are seldom employed in regular practice in this country. The *Fumaria officinalis*, *F. capreolata* and others were at one time in high repute as alterative bitters, especially in cutaneous affections, and they still are employed in Europe, particularly in France and Germany, by many eminent practitioners, both in these cases and in derangements of the liver. They are given either in decoction, extract, syrup, or the expressed juice. The tuberous root of *Corydallis bulbosa* has been employed as a substitute for the *Aristolochia clematitis* as a vermifuge and emmenagogue, but its remedial powers cannot be of a high order, since it is used in Siberia as an article of food. The root of *C. tuberosa* has been found to contain a peculiar alkaloid, to which the name of Corydalin has been given. Those of *Dicltra canadensis* and *D. cucullaria* found in many parts of the United States, are stated to be diuretic, diaphoretic, and alterative. Riddell states (*Synop.* 13) that Dr. Jones considers them "to be a substitute for mercury in venereal complaints." They are given in infusion, the dose of which is 3j. three times a day, and also used as a lotion to the diseased parts.

Fig. 68.

D. cucullaria.

Group IV.—Nymphales.

Order 8.—NYMPHÆACEÆ.—*Salisbury.*

Sepals and petals numerous, gradually passing into each other; the former persistent, the latter deciduous, and inserted upon the disk; stamens numerous, with petaloid filaments inserted on the disk; anthers adnate, introrse. Ovary polyspermous, many-celled, with radiating stigmas, alternate with the dissepiments, more or less surrounded by a large fleshy disk; ovules numerous, anatropal. Fruit many-celled, indehiscent. Seeds very numerous, attached to spongy dissepiments. Albumen farinaceous. Embryo small, enclosed in a fleshy vitellus, cotyledons foliaceous.

Fig. 69.

Nymphea.

Aquatic herbs, with peltate or cordate fleshy leaves arising from a prostrate trunk, and having large, showy,

and oftentimes fragrant flowers. They are principally found in the northern hemisphere, but also in South Africa, and one genus in South America.

The various species of *Nymphæa*, have been considered, from the earliest ages to be anaphrodisiac, sedative, and even narcotic, and their virtues have been celebrated by poets and naturalists, but more modern experience has shown that instead of being endowed with these properties, the roots of these plants are nutritious and even stimulating. According to Pallas, they are used as food by the Tartars; and analysis has proved that their principal constituents are fecula, tannin, gallic acid, &c. Nor are their hypnotic qualities better established, and their supposed good effects in affections of the genital organs, dysentery, &c., may be attributed to their styptic and astringent properties. In this country the roots of the *N. odorata* are sometimes used in emollient cataplasms, and in South America, the seeds of the *Victoria* form a favourite article of diet, as do those of the *Euryale* in China. Fee states that the roots of the *N. alba* may be used for tanning, and for dyeing a gray colour. The leaves of the *Nuphar* are said to be styptic; but in a dried state are used in Sweden to feed cattle.

Belonging to this group are the orders *Cabombaceæ* and *Nelumbiaceæ*. The first of these contains the *Brasenia purpurea*, a native of the United States, and used as an astringent demulcent in pectoral and bowel diseases. The plant is scentless but somewhat bitter, and abounds in mucilage. It appears to possess much the same properties as the Iceland moss, and might be used as a substitute for it.

Fig. 70.

B. purpurea.

The order *Nelumbiaceæ* has been celebrated from the most remote antiquity. The Asiatic species were considered as holy, and by the Hindoos were supposed to be the first plants that appeared. They were equally venerated in Egypt, their flowers being the mythic lotus so frequently represented on the monuments of India and Egypt, and the fruit believed to have been the sacred bean of Pythagoras. The roots of all the species are edible; and are much used in China, for although they are somewhat acrid when raw, they become bland and nutritious when cooked. Those of the *N. luteum* are said by Nuttall to resemble the sweet potato in taste, and are a favourite article of food among some

of the Indian tribes. The petioles and leaves may be eaten as greens, and the nuts are very analogous to chestnuts in taste, but if partaken of too freely, are apt to affect the bowels. The leaves are cooling and emollient, and form a good dressing for blistered surfaces. Endlicher states that the viscid juice of the stalks may be employed as a remedy against nausea and diarrhœa, and according to Ainslie, the petals were shown to Dr. Hamilton in Behar as a remedy in cases of dysuria. Loureiro (*Flor. Coch. Chin.* i. 340) says of it, "Radix seminaque esculenta sunt, sapida et salubria; in re medica virtutem habent refrigirantem et roborantem."

Group V.—Papaverales.

Order 9.—PAPAVERACEÆ.—*Jussieu.*

Herbs, rarely shrubs, with alternate, often divided leaves. Flowers in general, large and solitary. Sepals 2, caducous. Petals 4, caducous, arranged in a cruciate form, hypogynous. Stamens numerous, but always in some multiple of the petals, sometimes in 4 parcels, one of which adheres to the base of each petal; anthers innate. Ovary of one or more united carpels; style very short or none; stigmas stellate or radiate. Pericarp a one-celled, many-seeded capsule, opening by valves, holes, or pores under the permanent stigma; sometimes pod-shaped, with two placentæ. Seed with an oily or fleshy albumen and embryo.

The principal portion of this order are natives of Europe, fully two-thirds of the species being found there. Several are indigenous to North America, and it appears probable that many more will be discovered. They are unknown in a wild state within the tropics. They are for the most part annuals, the few perennials among them inhabit mountainous regions.

The plants of this order abound in an acrid milky juice, which is often narcotic, and in many cases highly poisonous. This pervades the whole plant with the exception of the seeds, which are in most cases oily and nutritive, though this is not invariably the case, as those of *Argemone Mexicana* are said to be narcotic and purgative, especially if smoked; they are also emetic, and are used as such in the West Indies; and Ainslie states that the juice is considered by the Hindoo physicians as a beneficial application in cases of ophthalmia, and also as a good application in chancre. The juice of the *Chelidonium majus* is extremely acrid, and was at one time esteemed as a powerful deobstruent and sudorific; it is a popular remedy against warts, and has been used with some success in piles. The root of *Sanguinaria* is acro-narcotic, and emetic, and that of *Meconopsis Nepalensis* is said to be an active poison. The juice of *Bocconia frutescens* is acrid, and has been found useful in destroying warts, and as an application to obstinate cutaneous eruptions and foul ulcers. (*Macfadyen, Flor. Jam.* 23.)

Papaver.—*Linn.*

Sepals 2. Petals 4. Stamens numerous. Style wanting; stigmas numerous, sessile, stellately arranged on the summit of the ovary. Capsule superior, with many-seeded placentæ, forming incomplete septa, opening by many pores under the stigma.

This genus consists of herbaceous, generally annual plants, with large flowers of various shades of colour, especially of red and white, rarely yellow, never blue. It is almost European; with the exception of three or four species, they are all natives of that continent. A few have become naturalized in the United States, but are not common.

P. somniferum, *Linn.*—Caulescent, glabrous, glaucous. Leaves amplexicaul, ovate-oblong, incised-dentate, glabrous. Sepals glabrous. Capsules obovate or globose, glabrous.

Linn. *Sp. Pl.* 726; De Candolle, *Prod.* i. 119; Torrey & Gray, *Flor.* i. 60; Woodville, 185; Stephenson & Churchill, iii. 159; Lindley, *Flor. Med.* 15.

Common names.—Poppy; Garden Poppy; White Poppy.

Foreign names.—Pavot des Jardins, *Fr.*; Adormidera, *Sp.*; Gartenmohu, *Gr.*; Papavero, Pappardolo, *It.*

Description.—The root is tapering and white: the whole plant is generally smooth, though sometimes there are a few rigid hairs on the upper part of the stem; it is of a glaucous colour, and of an unpleasant smell. The stem is round, erect, somewhat branched, leafy, and from two to four feet in height. The leaves are large, alternate, incised and dentate, clasping the stem at their base. The flowers are large, various in colour, and supported on long terminal footstalks. The calyx is smooth and consists of two ovate, concave, obtuse sepals which fall off on the expanding of the flower; this is of four petals, which are roundish, spreading, undulated, and as it were, plaited, white, with a violet spot at base. The stamens are very numerous, much shorter than the corolla, and terminated by oblong, compressed anthers. The ovary is nearly globular, smooth, crowned with a flat, stellate stigma. The capsule is large, smooth, one-celled, but with partial dissepiments. The seeds are very numerous, small, of a whitish or gray colour, somewhat kidney-shaped, at maturity escaping by openings under the stigma; they are oily and destitute of any narcotic power.

Fig. 71.

P. somniferum.
1. Capsule of P. officinale. 2. do. of P. somniferum. 3, 4. Seeds.

There are two varieties said to exist; the *nigrum*, with coloured flowers, dark seeds and large globular capsules, with openings for discharge of the seeds under the stigma; and the *album* with white flowers and seeds, and ovate capsules with no seed openings. These have been considered as species by some botanists; thus the first is the *P. somniferum*, Gmelin, and the other *P. officinale;* however distinct they may be in a state of nature, under cultivation these run into each other, and seeds from the same capsule will furnish plants bearing flowers of different colours. The black-seeded variety is the *P. cæruleum* of the older writers on the Materia Medica.

The Opium Poppy is a native of Persia, but has become naturalized in Europe and even in the United States. In Persia, according to Chardin, it attains a prodigious size, and the capsules are of great bulk; in Europe and the United States it is seldom more than from three to four feet in height, and the capsules are of moderate proportions.

It was well known to the ancients, and is spoken of by Homer as then cultivated in gardens, and even the two varieties are noticed by Hippocrates, as not possessing identical properties. It is now largely cultivated in many parts of Asia, for the purpose of procuring opium from it, and in Europe to obtain opium, but principally for the heads and seeds. In the United States it has seldom been grown except as an ornamental flower, but there is every reason to believe that it would prove a very lucrative branch of industry, not only from the opium that might be obtained, but also from the oil to be procured

from the seeds, which is an excellent substitute for that of the olive, and is much employed to adulterate it.

Medical uses, &c.—Poppy-heads. These are recognised in most Pharmacopœias as officinal, but are not ordered to be gathered at the same stage of growth, and as this influences their medicinal powers in no slight degree, it is of some importance that the directions should be uniform: when collected in an immature state, they contain much opium, but this in a great measure disappears on the ripening of the capsule, as is evident by merely tasting them; where they have been gathered unripe, and then dried, there is a marked bitterness, which is scarcely perceptible in those that have been suffered to come to maturity. As found in the shops, they are of various sizes and of either an ovate or globular form. They are much used, and more especially on the continent of Europe, as a mild substitute for opium, particularly in cases of children, and also in the form of decoction as an external anodyne emollient.

Poppy Seeds and Oil.—The seeds are extremely numerous, a single capsule containing from 10,000 to 30,000. They are bland and oleaginous, and were formerly employed as an article of food, and Hippocrates classes the poppy among the alimentary plants; their use, however, was much more limited among the Greeks than among the Persians and other Asiatic nations. They still form an habitual article of diet in some parts of Europe. As they possess no narcotic quality whatever, they may be freely eaten. Their principal consumption is for the purpose of procuring an oil from them; with this intent they are extensively cultivated in the north of France and in Flanders, where the oil is known under the name of *huile d'œillette*, a corruption, according to De Candolle, of *olivetto*. The seeds furnish from one-quarter to one-half their weight of oil; this is transparent, light, and of a pale colour; it is inodorous, and has a bland and pleasant taste. It is used for painting, for burning, and very largely to mix with olive oil. According to Mr. Allen (*Practical Tourist*, ii. 161), large quantities are shipped to the south of France, and even to Italy, to be there mixed with olive oil, or else it is exported under the name of olive oil, without any of this latter product entering into its composition. Fortunately the fraud is an innocent one, as the Poppy oil is fully equal in taste and properties to most of the olive oil that comes to the United States, though somewhat inferior to the finest qualities.

Opium.—The most general use made of the Poppy, is the extraction of Opium from it, for which purpose it is extensively cultivated in various parts of Asia. The best account of this culture, and of the preparation of the Opium in Turkey, from whence the best qualities of the drug are obtained, is given by M. C. Texier (*Am. Journ. Pharm.*, i. 253). He states that "the seeds are sold by measure of 60 ocques, at 20 paras the ocque; that is 30 piastres (about a dollar and a half). The ocque is equal to $2\frac{3}{4}$ pounds. They begin to work the earth in December, by means of a hoe, or sometimes of a plough. The furrows are sufficiently large to permit persons to pass without injuring the stems of the plants; the seeds are sown broadcast in beds three and a half feet wide; the plants are thinned, and great care taken to prevent the growth of weeds." A few days after the flowers have fallen, the heads are slit horizontally, taking care that the incision does not penetrate into the interior; a white, milky fluid exudes, which is left for twenty-four hours, and then scraped off with large dull knives. Each head furnishes but a few grains of opium. The drug is sophisticated, by portions of the epidermis being mixed with it, thus increasing the weight about a twelfth. The opium is now in the form of a glutinous but granular jelly. It is placed in small earthen vessels and pounded, the operator spitting into it from time to time. When they are asked why they do not employ water

instead of saliva, they reply that water would injure the opium. The opium is then wrapped in dry leaves, and is fit for sale. The seed is not injured by the extraction of the opium from the capsules.

It appears, from the accounts of other travellers, that the process of extraction varies in different countries; thus, in Persia, Kœmpfer states that the incisions are made transversely, with a many-bladed knife. In India, according to Mr. Royle (*Productive Resources of India*), the Poppy not being a native of tropical climates, is not cultivated during the hot months, but from October to March. He further states, that the plant requires good soil, and above all a careful management of the irrigation, as the strength of the juice depends upon the quantity of moisture, and even that of the dew which collects upon the capsule,—a deficiency of it preventing the proper flow of the milky juice, whilst an excess, besides washing off the milk, separates the soluble from the insoluble portions of the Opium. This is confirmed by Mr. Texier, who says that, in Turkey, a few days' rain in May and June, when the capsules are formed, causes a great loss of Opium.

An inspection of different kinds of Opium also shows that the modes of extracting it, and the subsequent manipulations it undergoes, vary according to the place in which it is grown; thus some of the Turkey Opiums have evidently undergone no other preparation than that of agglutination, as they are formed of small tears or drops, which would not be the case if prepared as noticed by Mr. Texier. In Persia, according to Kœmpfer, it is pounded in a mortar with water, and is well worked with a wooden spatula, and hence the masses present no appearance of drops or tears, but are of a uniform texture. This is also the case with the Indian, which is subjected to additional manipulations before it is exposed for sale, which are thus described by Dr. O'Shaughnessy (*Manual of Chemistry*), as practised at the government factory at Behar: "The reception of Opium at the government factories commences with the hot season and terminates late in the rains. The drug generally arrives in batches or *chelans* of several jars, the production of one *zillah*, or its subordinate *kotés* or districts. The jars contain from twenty seers to one maund, and it is no uncommon event to have five hundred of these paraded in the morning for the inspection of the Opium agent and his assistants. The first examination, and the resulting classification, are extremely simple; the examiners thrust a slit bamboo into the contents of the jar, and judge from experience of the state of consistence, flavour, and colour of the specimen. Marks are chalked on the jar, according to the degree of each of these qualities, from 1. 1. 1. to 4. 4. 4. inclusive.

Opium of the first class is of a fine chestnut colour, aromatic smell, and dense consistence; it is moderately ductile, and, when the mass is torn, breaks with a deeply-notched fracture, with sharp, needle-like fibres, translucent, and ruby red at the edges. 100 grains of this opium will yield to cold distilled water an extract of from 35 to 45. If 100 grains be evaporated at 212°, it loses from 20 to 28 per cent. of water, giving a consistence of from 72 to 80, the standard of the factory.

The second class is of a darker colour, less agreeable smell, softer texture, and often shows black specks on its surface and texture; it is more ductile, but breaks with a more even fracture. Its consistence ranges from 65 to 70, and yields an extract averaging from 27 to 35 per cent. The third class is black, pasty, of a very heavy smell, drops from the examining rod, gives off from 40 to 50 per cent. of moisture on evaporation; the extract is very dark and deliquesces rapidly. The last class comprises all that is too bad to be used in the manufacture of balls; it is of all colours, from deep black to

bright brown, and of all degrees of consistence, from fluidity to a solid texture.

After this examination, a portion is taken from each parcel and mixed together, and from this, three samples, of 100 grains each, are weighed and evaporated to dryness; if the residue is above 70, a corresponding price is paid, and vice versa. The amount of extract is taken at the same time. On these data, the contents of the jars are sorted for mixture in great tanks; the jars are then washed, and the washings, with the opium of the last class, is used as paste to agglutinate the covering of the petals in making up the balls or cakes.

When all the opium has been received, the tanks are gradually cleared of their contents, and the soft mass exposed to the action of the air, until it dries to a consistence of 69 or 70. It is then made up into cakes, of a certain weight, each covered with a layer of the petals of the plant. These are carefully dried. Some of the best opium is prepared with more care for the medical service.

But it is not in Asia alone that opium has been collected; many successful attempts have been made in England and other parts of Europe, but the culture of the poppy for this purpose has been very limited, and rather for the purposes of experiment than for sale. These trials have shown that an article fully equal to Turkey opium can be prepared, and at a lower price.

There are many varieties of opium known in commerce, the principal of which are the Smyrna or Turkey, the Egyptian, and the East Indian, the two first of which alone come to the United States. The first is in irregular, rounded, or flattened cakes, enveloped in the petals of the plant, and covered with the capsules of a Rumex. The fracture is waxy, the odour strong, and the taste bitter and nauseous. The Egyptian is in round flattened cakes, of a more regular form than the last, covered with a leaf, but not with the seed-vessels of a Rumex. This is inferior to the Turkey, though sometimes parcels are met with as rich in Morphia, but the quality is by no means uniform.

No plant has more engaged the attention of chemists than the Poppy and its products; but notwithstanding the numerous examinations made, nothing of importance was developed until 1803, when the investigations of Derosne, Seguin, Sertuerner, and others, showed that opium owed its powers to the presence of certain peculiar principles; and later experimenters, in following up the path thus opened to them, have demonstrated that this drug is extremely complex in its composition, containing no less than 17 or 18 constituents, of which Morphia is the most important. These are morphia, narcotina, codeia, narceia, meconine, paramorphia, pseudomorphia, meconic acid, brown extractive, resin, fatty oil, gummy matter, caoutchouc, albumen, volatile oil, lignin, &c. It does not comport with the character of this work to enter into an examination of the methods of separating these various substances, nor their respective action on the human system; an able abstract on this subject will be found in Pereira's Elements of Materia Medica.

Effects of Opium.—The precise action of opium on the system has been the subject of much controversy, and the most opposite opinions have been promulgated respecting it; some regarding it as a direct sedative, while others have asserted that it was a powerful stimulant; but it is now generally admitted that it may be so given as to obtain from it both these effects, and that whilst the former are primary, and the result of a moderate dose, the latter are secondary, and caused by a larger quantity. When given in a moderate dose to a person not habituated to its use, it first produces excitement of the pulse, with a pleasant exhilaration of mind; this is followed by a diminution of muscular power and a lessened susceptibility to external impressions, with

an irresistible tendency to sleep; all the secretions are diminished except that of perspiration, and there is often nausea and vomiting. The stimulant operation seldom lasts more than one hour, but the sedative effects persist for several.

When an excessive dose is taken, the sedative influence is almost immediate, there being no stimulant stage: there is giddiness and stupor, which rapidly increase, and the person becomes insensible to all external impressions, with heavy and stertorous breathing, a slow and oppressed pulse, and contracted pupils. This state continues some time, when the pulse sinks, relaxation of the muscles comes on, and death ensues, or else violent convulsions come on, which cease a short time previous to the final event.

The quantity requisite to produce these phenomena, varies with almost every individual. To some constitutions opium is injurious in very small doses, whilst on others, again, it acts with very diminished powers; this may arise from the effects of habit or the presence of pain, both of which modify the action of this drug in an astonishing manner. The effects of habit in diminishing the powers of opium on the system are fully exemplified in the large quantities which are daily used with impunity by confirmed opium eaters; thus, De Quincy, in his extraordinary work, the "Confessions of an English Opium Eater," acknowledges to have taken 8000 drops of laudanum or 210 grains of opium per diem; and in Pereira's Materia Medica a case is recorded, where an opium eater was in the habit of taking from 120 to 150 grains of solid opium in the same space of time. In Turkey, in consequence of the prohibition of wine and spirituous liquors, the consumption of opium as a stimulant was at one time very great, but of late years has much declined, from a relaxation of the laws respecting the sale of alcoholic drinks, though great numbers of *teriakis*, or opium eaters, are still to be met with who take this narcotic in large quantities. At the opium shops, where it is sold, it is mixed with a rich syrup, or made up into small lozenges with spices.

Notwithstanding the morbid effects produced by the use of opium, it has been disputed whether its habitual employment tends to shorten life, and Dr. Christison has given many cases, which serve to prove that it does not; but it is evident that these and other instances which have been adduced are merely exceptions to the general rule, and cannot be considered as establishing that the habitual use of a deleterious article is innocuous, for nothing can be more distressing than the condition of those who indulge in this species of intoxication, when they are not under the influence of the drug.

Another mode in which opium is largely used, especially in China and the Malayan Archipelago, is that of smoking it; this appears even more injurious than taking it in substance. We are told that it occasions stupor, forgetfulness, deterioration of the mental faculties, emaciation, debility, and loss of appetite; and if the stimulus be withheld, a train of still more distressing symptoms, and even death, ensue.

The action of opium is also greatly diminished where violent pain exists at the time of taking it, or in peculiar conditions of the system, as tetanus or mania à potu; in such cases, immense doses of opium have been administered with scarcely a sensible result, the disease appearing to overcome the powerful properties of the drug.

Opium diminishes all the secretions, except that from the skin, which it generally promotes, more especially if given in combination with a small portion of ipecacuanha. It is also said not to arrest the secretion of milk or the catamenial discharge in females. In some cases, on the other hand, instead of arresting secretions and discharges, it promotes them, and will act

as a purgative or diuretic, according to the peculiar idiosyncrasy of the individual.

When opium or any of its preparations have been taken in poisonous doses, the great object is to evacuate the contents of the stomach. This may be done either by means of emetics or the stomach-pump. The best emetic in these cases is the sulphate of zinc in large doses; when not to be procured, the sulphate of copper. Tartar emetic or ipecacuanha may be resorted to, or if not at hand, a spoonful of mustard or common salt mixed in a tumbler of warm water, will often prove effectual. Where it can be procured, the stomach-pump is the most effectual mode of thoroughly removing the poison; after it has been thoroughly evacuated, the administration of coffee, and of some of the milder stimuli, has been found useful, and every means must be resorted to to prevent the patient from falling into a lethargy, by keeping him in continual motion; in extreme cases, flagellation to the palms of the hands and soles of the feet has been found very successful. The affusion of cold water has also been used in some cases with decided benefit, even where other means had failed. When the respiratory function is imperfectly performed, artificial inflation of the lungs must be practised. General bleeding in these cases, more especially whilst any of the poison remains in the stomach, is decidedly injurious, as the abstraction of blood favours absorption. Topical bloodletting by means of cups to the head, is, however, requisite in some cases; where a poisonous dose of opium has been taken, it generally proves fatal within twelve hours; those who survive longer, usually recover, though cases have occurred where there was a partial recovery, followed by a fatal termination.

The appearances after death in cases of poisoning by opium, are by no means marked, or indicative of the cause, being principally confined to a turgescence of the vessels of the brain, and even this is not always present. Where there are marks of inflammation in the alimentary canal, these are to be attributed to the vehicle in which the narcotic has been taken, and not to the poison itself.

Opium is given in a vast variety of forms; in substance as powder, pill, or electuary, in solution, in tincture, and in combination with the vegetable acids, and in these various forms, either alone or in combination with other articles. Of late years, morphia and its salts have been much employed instead of opium or its preparations. The forms recognised by the U. S. Pharmacopœia are pilulæ opii, confectio opii, pulv. ipecac. et opii, tinctura opii, tinctura opii camphorata, vinum opii, morphia, morphiæ acetas, morphiæ sulphas,

The medium dose of opium is one grain; of the tincture, twenty-five drops, and of morphia and its salts, one-sixth of a grain.

For full information on the subject of the preparations, reference may be had to Pereira's Elements of Mat. Med. vol. ii.

Several other species of poppy have been used in medicine, but none of them have attained any celebrity except the *P. rhœas* or corn-poppy of Europe, now naturalized in some parts of the United States. This beautiful flower is exceedingly common in the grain fields of Europe, and proves very detrimental to the agriculturist. It flowers in June and July, when its brilliant red petals render it a conspicuous object. Its capsules contain a milky juice in small quantities, similar to that of the *P. somniferum*, but it is the petals only that are employed medicinally. These form the basis of a syrup which is recognised as officinal in some of the Pharmacopœias, but is possessed of very feeble powers, and is seldom prescribed in this country. It is of a beautiful red colour, and has the power of tinging the mucous membrane of the stomach of a bluish-red, resembling that caused by inflammation. The dose of the syrup of poppies is from half an ounce to an ounce.

Sanguinaria.—*Linn.*

Sepals 2. Petals 8-12. Stamens 24. Stigmas 2, connate. Pericarps oblong, pod-like, acute at each extremity, 2-valved. Seeds numerous, obovate.

A genus named from the circumstance of the root containing a large quantity of a blood or rather orange-red juice; it consists of but one species, peculiar to North America.

S. canadensis, *Linn.*—Leaves radical, solitary, cordate, lobed; scape sheathed at base, 1-flowered; petals oblong, obtuse.

Linn. *Sp. Pl.* 723; Torrey & Gray, *Fl.* i. 62; Barton, *Veg. Mat. Med.* i. 31; Bigelow, *Med. Bot.* i. 75; Rafinesque, *Med. Flor.* ii. 78; Lindley, *Med. Flor.* 16.

Common names.—Blood root, Puccoon, Turmeric, &c.

Description. — Root a horizontal, fleshy rhizome, truncate or præmorse, giving off a few fibres, and abounding in a bright orange juice. The leaf and flower spring up together, the scape and flower-bud being enveloped in the young leaf, which unfolds as the flower expands. The leaf is erect, supported on a long petiole, cordate or subreniform, smooth, of a green colour above, and glaucous beneath. The scape is 1-flowered, erect. The calyx is formed of two ovate, obtuse sepals, which fall off as soon as the corolla expands; this is composed of eight or more spreading, oblong, obtuse petals, of a white colour. The stamens are numerous, short, with orange-coloured, oblong anthers. The ovary is oblong and compressed, and crowned with two connate stigmas. The capsule is oblong, narrowed at each end, 2-valved, and containing numerous, obovate red seeds, with a white arillus.

Fig. 72.

S. canadensis.

This beautiful plant is one of the first harbingers of spring, expanding its delicate white petals in March and April. It is found in most parts of the United States, in rich, light soil, on shaded banks, or at the edge of woods. The flowers are devoid of smell, and the petals are very caducous. The leaf is small whilst the plant is in blossom, but rapidly increases in size afterwards. The whole plant is pervaded with an acrid orange-coloured juice, which is in greatest abundance in the root. There are several varieties differing in the number and form of the petals, but none of them are perma-

nent. It has a marked tendency when in a wild state, to multiply its petals, and under cultivation often produces double flowers. It bears transplantation very well, and thrives luxuriantly in a garden.

This plant was well known to the Indians, who employed it to paint themselves with, and as a dye for a variety of articles. It has not been used to any extent in the arts, as the colour is apt to fade; if means could be found to render it permanent, it would become an important article to the manufacturer. From experiments made by Dr. Downey, it appears that the sulphate of alumine will partially fix the colour on woollen stuffs, and the murio-sulphate of lead on cotton and linen.

Medical Uses. — The medicinal powers of Sanguinaria have been investigated by Dr. Downey, who made it the subject of an inaugural dissertation in 1803, and at a later period, in the fullest manner, by Dr. Tully, who considered it one of the most valuable of our native remedies. He attributes to it the action of squill, seneka, digitalis, guaiacum, and ammoniacum. This is evidently going too far, and has not been corroborated by the experience of other practitioners, though there is no doubt of its active properties, which are those of an acrid narcotic, acting, in doses of ten grains to a scruple, as a powerful emetic, and often occasioning a sense of burning heat in the stomach, with vertigo, prostration of strength, and other untoward symptoms. The root is generally used, but every portion of the plant is endowed with active qualities; the seeds are apparently more narcotic than the root, and cause symptoms resembling those produced by stramonium.

From the experiments of Dr. Dana, in 1824, it is shown that Sanguinaria owes its powers to the presence of an alkaloid principle, which he has called Sanguinarina. His analysis has been confirmed by that of Mr. C. J. Lee (*Am. Jour. Pharm.*, i. 32). It is obtained by digesting the powdered root in alcohol, precipitating with ammonia, decolorizing by means of animal charcoal, redissolving in alcohol, and evaporating to dryness. The principle thus separated is of a white colour, changing, on exposure to the air, to a light yellow; it is extremely acrid, and possesses the properties of an alkali. The salts it forms with the acids are various rich shades of red, crimson, or scarlet. It has not as yet been employed in medicine.

Sanguinaria has been successfully administered in many diseases of the lungs, and has been recommended in rheumatism and diseases of the liver. The powder and decoction have also been found useful in the treatment of ill-conditioned ulcers, as an escharotic or wash. Dr. Shanks, of Tennessee, cured a case of gelatinous polypus with Sanguinaria, after extraction had twice failed. (*Am. Jour. Med. Sci., Oct.* 1842.) Its exact powers in these and other complaints require further investigation, and deserve the attention of the profession. It may be given in powder, of which the dose, as an emetic, is from 10 to 20 grains; as a stimulant or expectorant, 3 to 5 grains several times a day. It may also be given in infusion, made with half an ounce of the root to a pint of water, the dose being a tablespoonful. The tincture, which is officinal, may be administered in doses of half a drachm to half an ounce, according to the indications to be fulfilled.

Dr. Downey states that the leaves are used in veterinary practice in Maryland, to produce sweating, and thus facilitate the shedding of their hair in the spring; and from our own experience with it for this purpose, we are convinced of its efficacy, and also of the powers of the fresh root, given at intervals, mixed with the usual food, in the destruction of bots in these animals. One or two roots, chopped fine and mixed with oats or in a mash, will be generally found sufficient.

ARGEMONE.—*Linn.*

Sepals 2. Petals 4–8. Stamens indefinite. Stigmas 4–7, nearly sessile, radiating, concave, free. Capsule obovate, opening at the apex by valves. Seeds globose, pitted, and reticulated.

A small genus of annual glaucous plants, having sessile leaves, which are repand-sinuate or pinnatifid, with prickly teeth. They abound in an acrid yellow juice. They are principally found in warm climates, but have become naturalized in the more temperate regions.

A. MEXICANA, *Linn.*—Leaves usually mottled with white; flowers solitary; calyx glabrous, prickly; petals yellow or white; capsules prickly.

Linn., *Sp. Pl.* 727; Torrey and Gray, *Fl.* i. 61; *Botan. Mag.* t. 243.

Common Names.—Prickly Poppy, Yellow Thistle, Thorn Poppy.

The Thorn Poppy is a native of Mexico, the West Indies, and the southern and western parts of the United States, and has become naturalized in many parts of the world, especially in India. The whole plant abounds with a milky, viscid juice, which, on exposure to the action of the air, becomes of a bright yellow colour, resembling gamboge. This juice has an acrid, unpleasant taste, but is almost inodorous.

Medical Uses.—The inspissated juice, according to Long (*Hist. Jamaic.*, iii. 845), has been found useful as a hydragogue purgative in dropsies and jaundice. In Java, the fresh juice is administered internally in obstinate cutaneous affections, and applied externally to warts, chancres, and ill-conditioned ulcers; and Ainslie (*Mat. Ind.*, ii. 43) states that it is considered by the Hindoos as a valuable remedy in ophthalmia, rubbed on the tarsus, or even dropped into the eye.

The seeds are employed, in the West Indies, as a substitute for ipecacuanha, in doses of two drachms infused in a pint of water (*Wright, Med. Plants W. Ind.*) They also act on the bowels, and are used as a purgative in many parts of South America (*Aublet. Hist. Guiane*). An oil prepared from them has much reputation in India as an application to tinea capitis, and is also considered beneficial as an external application in cases of headache occasioned by exposure to the heat of the sun. It is likewise used as a purgative and deobstruent, and also for the domestic purpose of burning in lamps. It is asserted (*Journ. de Pharm.*, xiv. 73) that this oil is as active as that of the *Croton tiglium;* but this is erroneous, as is the statement of Long, that the seeds are a more powerful narcotic than opium. The flowers are said by De Candolle (*Essai*, iii.) to be administered in Mexico as a hypnotic.

CHELIDONIUM.—*Linn.*

Sepals 2. Petals 4. Stamens somewhat numerous. Capsule pod-shaped, narrow, 2-valved; valves dehiscing from base to apex. Seeds numerous, with a glandular cristate raphe.

A genus of perennial herbs, furnished with a yellowish acrid juice, and containing probably but a single species, which is a native of Europe, but has become extensively naturalized in the United States and elsewhere.

C. MAJUS, *Linn.*—Peduncles many-flowered. Pedicels somewhat umbellate. Leaves pinnately divided, glaucous. Segments ovate, cuneately-incised or lobed, terminal one cuneiform-obovate. Capsules torulose.

Linn. *Sp. Pl.* 723; *Eng. Bot.* i. 1581; Woodville, i. 140; Stephenson and Churchill, ii. 86; Torrey and Gray, *Fl.* i. 62.

Common names.—Celandine, Tetterwort.

Celandine is a native of most parts of Europe, and is extensively naturalized in the United States, growing in waste places, and flowering throughout the summer. The whole plant is very brittle, and exudes when broken, an orange-coloured, fœtid juice. Its taste is intensely bitter and acrid, occasioning a sense of burning in the mouth and fauces, which lasts for some time. The root is more powerful than the stems, and is the part generally used. The active principle is soluble both in water and alcohol, and although not volatile, is somewhat diminished by drying. According to an analysis by Chevallier and Lassaigne (*Jour. de Pharm.* iii. 451), the juice of this plant contains—a bitter resinous substance, of a deep yellow colour; a gum-resin of an orange colour, having a bitter and nauseous taste; albumen; some salts, &c. Thomson is of opinion that it is very analogous to gamboge both in composition and properties.

Medical uses.—Although Celandine is now but seldom employed in regular practice, it at one time enjoyed a very high reputation as a stimulating aperient, diuretic, deobstruent, and sudorific, and was thought to be particularly efficacious in the removal of obstructions of the liver, in promoting expectoration, and in the cure of chronic cutaneous affections; thus Miller (*Compend. Herb.*) says, "it is aperitive and cleansing, opening obstructions of the liver and spleen, and of great use in curing the jaundice and scurvy. Some reckon it cordial and a good antidote against the plague. It is put into *aqua mirabilis*. Outwardly it is used for sore eyes, to dry up rheum, and to take away specks and films, and also against tetters and ringworms, and scurfy breakings out." It may not be as effectual in the treatment of these various affections as is stated, but is certainly possessed of much activity, and is one of those remedies that has been unduly neglected in our rage for new and foreign drugs.

According to the observations of numerous German practitioners, its beneficial results in scrofula are unequivocal; Wendt and Kuntzmann have given cases where it proved completely successful in this disease (*Jour. Hufland*, 1813). As a drastic and hydragogue purgative it appears fully equal to gamboge, and might replace it in all cases in which the foreign article is used. It has also been recommended as an external application to the feet, in those œdematous swellings succeeding fevers. Recamier is of opinion that it has a peculiar elective action on the spleen, and hence is very effectual in removing engorgements of that viscus.

Externally the juice has long been known as a caustic for the removal of warts, and is said to be very efficacious in stimulating and healing old and indolent ulcers, speedily removing fungous flesh, and giving a healthy action to the torpid and indolent granulations. Hildanus, Ettmuller, Geoffroy, and others attest the powers of the juice, when diluted with some bland liquid, in specks and opacities of the cornea. A cataplasm of the bruised leaves has also been successfully used in herpes and obstinate psora.

The dose of the dried root is from 3ss. to 3j.; of the fresh juice from 30 to 40 drops, mixed with some bland liquid; of the watery extract 5 to 10 grains; and of the vinous tincture about 3j. to 3ij.

Group VI.—Cruciferales.

Order 10.—BRASSICACEÆ.—*Lindley.*

Herbaceous, rarely shrubby plants, with alternate leaves, and small white, yellow, or whitish-purple flowers. Sepals 4, deciduous. Petals 4, hypogynous, alternate with the sepals, cruciate, regular, nearly equal. Stamens 6, two of which are shorter, and usually inserted rather lower than the others; the other four in pairs. Anthers introrse. Torus with 2 or more glands, between the stamens and the ovary. Ovary generally of 2 cells, with a membranaceous (spurious) partition. Style short or none, with a two-lobed or double stigma. Pericarp a silique or silicle, opening by the two valves separating from the permanent placenta, usually 2-celled, many-seeded (rarely 1-celled, and indehiscent.) Seeds mostly pendulous, attached in single rows to each edge of the placenta, with no albumen. Embryo with the cotyledons variously folded on the radicle.

This is a very extended and, at the same time, very natural family of plants, all the species composing it being closely allied in structure and properties. It is divided into two great sections, founded on the structure of the fruit, the *Siliquosæ* and the *Siliculosæ*. It is equivalent to the 15th class of the sexual system, or Tetradynamia, a striking instance of a perfectly natural group in a purely artificial arrangement. It has been divided by botanists into many tribes, founded on the number and character of the cotyledons, which tribes are again subdivided, according to the structure of the pericarp.

The Brassicaceæ are all more or less acrid and pungent. In some of them, this acrid principle is in union with a considerable quantity of mucilage, when they become useful articles of food. The acridity in all of them appears to depend on a volatile oil, which is dissipated by heat. A very large number of culinary vegetables and condiments are derived from this class, as all the varieties of Cabbage, the Turnip, Mustard, Horse Radish, Cress, &c.

As medicinal agents they are of little importance, though from the pungency of the volatile oil contained in some of them, they are frequently employed as external stimulants, and sometimes administered internally to excite the intestinal canal. They are, however, all useful as antiscorbutics. The U. S. Pharmacopœia recognises but two of them as officinal, the Horse Radish and Mustard.

Cochlearia.—*Linn.*

Silicle ovate, globose, or oblong; valves ventricose. Seeds many, not bordered. Calyx equal, spreading. Petals 2-parted. Stamens not toothed. Style short or none. Flowers white. Leaves usually fleshy.

C. armoracia, *Linn.*—Radical leaves, oblong, crenate; cauline leaves lanceolate, dentate, or incised. Silicle ellipsoid.

Linn. *Sp. Pl.* 904; *Eng. Bot.* xxxiii. t. 2323; Woodville, *Med. Bot.* t. 150; Stephenson and Churchill, *Med. Bot.* ii. 114; Lindley, *Med. Flor.*

Common Name.—Horse Radish.

Foreign Names.—Grand Raifort, Moutarde des allemands, *Fr.*; Meerettig, *Gr.*; Barba forte, Rafano, *It.*

Fig. 73.

C. armoracia.
1. Radical leaf. 2. Raceme. 3. Stamens and pistils. 4. Pistil. 5. Silicle.

Description.—The root is long, white, cylindrical, striking deep into the earth. The stem is round, erect, branched, and about two feet high. The radical leaves are large, petiolated, of a dark green colour, crenate, waved, and sometimes lobed; those of the stem are few, scattered, smaller, sessile, lanceolate, sometimes entire, but generally more or less toothed. The flowers are numerous, white, and in terminal clusters. The sepals are ovate, concave, and deciduous. The petals are obovate, twice as long as the sepals, and unguiculate. The stamens are as long as the calyx, incurved and supporting heart-shaped anthers. The ovary is oblong, with a short style, bearing a short capitate stigma, and changing into an elliptical, compressed, bilocular pod, containing about four seeds in each cell, many of which are abortive.

The Horse Radish is a native of many parts of Europe, growing naturally in moist and rich soils, and has long been cultivated for the sake of its roots, which are extensively used as a condiment. When planted in gardens it is extremely difficult to be eradicated, as the roots are furnished with many buds or eyes, each of which will give rise to a plant. They should always be grown in a rich and somewhat moist soil, otherwise they will be small and stringy. This plant is said to have been known to Dioscorides and Hippocrates, but this is extremely doubtful, though it was in use in the time of Pliny.

The root, which is the only part used, has a pungent odour, and a warm acrid taste with a slight sweetness. It imparts its properties to water and alcohol, and in a still greater degree to vinegar. These qualities depend on the presence of a volatile oil which is dissipated by heat or desiccation; on drying, the root first becomes sweetish, and afterwards nearly insipid; it may be kept for a long time uninjured if covered with sand in a cool place. Its principal use is for a condiment to various kinds of animal food and more especially to beef, for which purpose it is grated or scraped and mixed with vinegar, if this preparation is kept in well-closed jars, it retains its pungency for a long time.

Medical Properties, &c.—As a remedial agent it acts very much like mustard, but promotes the secretions, especially that of urine, in a more marked manner. When taken into the stomach in any quantity, it excites that organ powerfully, and also operates as a sudorific and diuretic. It was at one time considered useful in paralysis and chronic rheumatism, and was used with success by Sydenham in dropsy supervening on intermittent fever. The infusion acts as an emetic, and like mustard, may be employed where there is torpidity of the stomach, either alone, or to aid the operation of other emetics. It has also been prescribed as a masticatory in paralysis of the tongue. Dr. Cullen states that a drachm of the root infused in four ounces of boiling water in a close vessel, and made into a syrup with double its weight of sugar, acts very beneficially in the removal of hoarseness arising from re-

laxation or a deficiency of secretion; a teaspoonful is to be taken at a time and swallowed very leisurely, repeating the dose from time to time. Dr. Withering also says that an infusion of this root in milk forms an excellent and safe cosmetic. Horse Radish has likewise been used as an external irritant, for which purpose it should be grated fine and mixed with vinegar; it acts promptly and energetically on the skin, and is a far neater application than a sinapism and in most cases quite as effectual. The dose of the root is one or two drachms cut into small pieces or grated.

Another species of this genus, *C. officinalis*, or Scurvy grass, is admitted into many Pharmacopœias, but is more generally used as a salad, than as a remedial agent. It possesses the sensible qualities of the order in a marked degree, and hence has been found very useful in scurvy, as its common name indicates. It has also been recommended in various other diseases, but is now deservedly abandoned and forgotten, except as a culinary vegetable.

Sinapis.—*Linn.*

Silique somewhat terete, valves ribbed. Styles short, acute. Seeds in a single row, subglobose. Calyx spreading.

The genus Sinapis is composed of numerous species of herbaceous plants, with yellow flowers, and lyrate, incised or pinnatifid leaves. They are almost all annual or biennial, and are found in all parts of the world. Two of them are recognised as officinal in most Pharmacopœias. The general name is that by which it is spoken of by Pliny and others; it was also noticed by Theophrastus and Dioscorides, and its properties fully known to them. De Theis is of opinion that the Romans derived their name for it from the Celtic, as *Nap* in that language is used for most of the cruciferous plants. The common name is supposed to be derived from *mustum ardens*, hot must, as the must of wine was formerly employed to prepare it for use.

1. S. nigra, *Linn.*—Siliques somewhat quadrangular, smooth, appressed to the stem; lower leaves lyrate, upper leaves linear, lanceolate, entire.

Linn. *Sp. Pl.* 933; Torrey and Gray, *Fl.* i. 99; Stokes, *Med. Bot.* iii. 475; Woodville, *Med. Bot.* t. 151; Stephenson and Churchill, *Med. Bot.* i. 42; Lindley, *Med. Flor.* 92.

Common Names.—Black Mustard; Mustard.

Foreign Names.—Moutarde, *Fr.;* Schwartzer Senfe, *Gr.;* Senape, *It.*

The Black Mustard is a native of the temperate regions of Europe, and is a troublesome weed in the grain fields; it has become naturalized in many parts of the United States, but is not very common in a wild state; it is, however, grown to some extent in many parts of the country, both for domestic use and as an article of commerce. The only parts used are the seeds; these are small and round, of a dark colour externally and yellowish within. They have little or no smell when entire, but when bruised exhale a peculiar odour, which becomes pungent on the addition of water or vinegar. The principal use of the Black Mustard seed is as a condiment, for which purpose it is prepared in several modes. In England, and most generally in this country, after being ground, the bran or husk is separated from the flour, which is then of a dark lemon colour. In France, the ground seed is used without sifting; this affords a brownish-yellow flour, which, although not as sightly, is far more powerful than when it is prepared in the English method. No article in common use is more often adulterated than flour of mustard; in some cases, what is sold as such, does not contain a particle of it, being composed of wheat flour, coloured with turmeric and rendered pun-

gent by red pepper. The seeds of many of the other Cruciferæ are also used as substitutes for, or adulterations of, the mustard; of these the wild Radish is the best, as with the exception of colour, it affords a flour in every respect similar to the Sinapis. In the East Indies, the seeds of several other species of Sinapis, as the *orientalis* and *chinensis* are used both in domestic economy and in medicine, instead of those of the *nigra*.

Medical Properties, &c.—The qualities of mustard are those of a volatile acrid stimulant; in small quantities it excites the stomach and promotes digestion, in larger doses it acts as an emetic, and in undue quantity causes all the phenomena of gastro-enteritis. When applied to the skin, it acts promptly and powerfully as a local excitant, producing redness, burning pain, and if long continued even vesication and ulceration.

The dose, as an emetic, is from a teaspoonful to a tablespoonful in a glass of water, and it is preferable to most other evacuants of the stomach, when this viscus is in an atonic condition, as it will often act when tartar-emetic or ipecacuanha wholly fail in producing emesis. In some cases it is given as a diuretic; for this purpose the best form of exhibition is mustard whey. The most general use of this article is for the purpose of stimulating the surface, in the form of a cataplasm. In making a mustard poultice, the best mode is to mix it with equal parts of rye or linseed flour and moisten to the proper consistence with warm but not boiling water, as the latter coagulates the albuminous or gummy constituents, and prevents the extrication of the volatile oil on which the irritating properties depend. Boiling vinegar has been recommended, but the experiments of Trousseau and others, show that the acetic or any other acid deprives the mustard of much of its activity.

The analyses of mustard, by Pelouze, Robiquet, Bussy, and many other chemists, show that its constituents are numerous and many of them very peculiar; the most important of these are myronic acid, myrosyne, and sinapisin, and it is to the mutual action of these on each other when water is added to the powdered seeds, that the volatile oil is owing, this principle not existing in a formed state in them; this is shown by alcohol extracting no volatile oil from the powder, but after the generation of this by a mixture of the farina with water, the alcohol takes it up readily.

2. S. ALBA, *Linn.*—Siliques hispid, not appressed to stem, shorter than the beak. Leaves byrate.

Linn. *Sp. Pl.* 923; Stokes, *Med. Bot.* iii. 474; Stephenson and Churchill, *Med. Bot.* i. 42; Lindley, *Med. Flor.* 92.

Common name.—White Mustard.

Foreign names.—Moutarde Blanche, *Fr.*; Luchettone, *It.*; Senfsamen, *Gr.*

Like the last-mentioned species the White Mustard is a native of Europe, but is also cultivated for the sake of its seeds. These, although resembling those of the Black Mustard in their qualities, are much milder, though they are frequently employed in the manufacture of mustard for table use. They attained great celebrity at one time in the treatment of dyspepsia and other atonic conditions of the stomach and bowels, and were considered as a panacea in all complaints of the digestive organs, but as with all other popular remedies, their injudicious use often produced a far worse train of evils than those they were intended to remedy. Given in doses of a spoonful once or twice a day, they sometimes prove beneficial by stimulating the digestive organs to a regular performance of their functions, but on the other hand

they have caused great irritation of the stomach and bowels, and in some cases fatal results have ensued.

The analysis of the white mustard seed would seem to prove that it differed much in composition from the black, as besides the common constituents of oily seeds, it is said to contain two peculiar principles, *sulphosinapisin* and *erucin*, and a non-volatile acrid principle is developed by the action of water on the farina, precisely as the acrid volatile oil is developed in the black mustard. (See Pereira, *Elem. Mat. Med.* ii. 686.) It is extraordinary that two seeds so analogous in their physical properties and derived from closely allied plants, should present such different constituents on analysis.

Fig. 74. Fig. 75.

Fig. 73. S. alba. Fig. 74. S. nigra.

Many other plants of this order have been and are still used as remedial agents, though their efficacy is extremely problematical. Thus the *Cardamine pratensis*, is said to be diuretic, sudorific and antispasmodic, and the flowers were once employed in epilepsy in children, and were recommended by Sir George Baker in cholera and spasmodic asthma. (*Med. Trans.* i. 442.) Several species of *Sisymbrium*, *Erysimum* and *Nasturtium* have likewise been celebrated as anti-scorbutics, and as remedies against hoarseness. The seeds of several of them, especially of the genus *Brassica*, furnish large quantities of oil, much used in the arts, under the name of rapeseed oil. Those of *Arabis chinensis* are prescribed by Hindoo practitioners as stomachic and gently stimulant, but are said to produce abortion in pregnant females, if imprudently given. The root of one species, *Isatis tinctoria*, yields a blue colouring matter, called woad, formerly a favourite dye, until superseded by Indigo. Numerous species are cultivated as ornamental plants, as the wall flower, stock, rocket, &c.

Order 11.—CAPPARIDACEÆ.—*Lindley.*

Sepals 4, either distinct, imbricated or valvate, equal or unequal, or cohering in a tube, the limb of which is variable in form. Petals 4, hypogynous, cruciate or irregular, usually unguiculate and more or less unequal, sometimes wanting. Stamens seldom tetradynamous, usually 6-12 or a high multiple of 4, definite or indefinite, inserted on a short or sometimes elongated torus; anthers innate or introrse, with a longitudinal dehiscence. Ovary stipitate or sessile, 1-celled, with two or more parietal placentæ; style none or filiform; stigma generally roundish. Fruit either pod-shaped and dehiscent, or baccate, rarely 1-2, mostly many-seeded. Seeds generally uniform, exalbuminous, but with the lining of the testa tumid. Embryo curved; cotyledons flattish, foliaceous: radicle taper, turned to the hilum.

A somewhat extensive order of herbs, shrubs, or rarely small trees, with alternate, petiolated, undivided or palmate leaves, without true stipules, but sometimes with spines in their places. The species are chiefly natives of the

tropics, a few, however, are found in more northern regions, especially in North America. The physical properties of the order are somewhat analogous to those of the cruciferous plants, but there is also conjoined in many of them an acrid and poisonous principle, rendering them suspicious and even dangerous. Thus the bark of the root of *Cratæva gynandra* blisters like cantharides; this is the case also with several species of *Capparis*, *Polanisia* and *Cleome*. Many have been employed medicinally, among which may be noticed the *Polanisia graveolens*, a native of the United States, which is an active anthelmintic, much resembling in its effects *Chenopodium anthelminticum;* the whole plant is used either in powder, decoction, or syrup. It was first noticed by Schöepf, and is a popular remedy in some parts of the country. The *Cleome felina* is stated by Dr. Hamilton to be used in India, bruised with milk and sugar, against epistaxis. (Ainslie, *Mat. Ind.* ii. 360.) The *C. icosandra* is employed in Cochin-China, as a rubefacient (De Candolle, *Essai*, iii.) The *C. triphylla* has some reputation in Hayti as an anti-scorbutic. (*Flor. Med. des Antill.* i. 202.) The *C. viscosa* is said to be used in India in cases of deafness. (Rheede, *Malabar*, ix. 23.) The *Gynandropsis pentaphylla*, a native of Asia and the United States, is considered in the former as a powerful sudorific, and is used externally in headache and other cephalic affections; a decoction of the seeds also is employed in convulsive attacks and typhus, (*Ainslie*, ii. 452.) Dr. Macfadyen also states that the juice, either alone or mixed with oil, is an excellent remedy in ear-ache, as a topical application, (*Flor. Jam.*) The best known plants of this order are those species of *Capparis*, as the *spinosa*, *rupestris*, *&c.*, which furnish the flower buds used to make the celebrated pickle and condiment called Capers. These are stimulating, anti-scorbutic, and even aperient. Another species, the *C. sodada*, has a narcotic odour, and its acrid stimulating fruit is employed to promote fecundity; and the roots of the *C. siliquosa* are reputed to be anthelmintic, aperient and stimulant. (*Flor. des Antill.* i. 141.) The same properties are attributed to the *Cadaba indica*. An infusion of *C. cynophallophora* has been found useful in dropsy. (*Flor. Jam.*)

Fig. 76.

C. spinosa.
1. Flower. 2. A petal. 3. Calyx and ovary 4. Section of fruit. 5. Section of seed. 6. Embryo.

It is evident that this order is endowed with active qualities, and is deserving of attention in a pharmacological point of view, but our information on the subject is extremely vague, and will require much investigation of the real properties of the several species, to ascertain their value as therapeutic agents, or to admit them into the already overcrowded lists of the Materia Medica.

Order 12.—RESEDACEÆ.—*De Candolle.*

Sepals 4-6, somewhat connected at base, persistent. Petals 4-6, or by abortion fewer, broad, fleshy, having lacerated appendages at the back, unequal. Stamens definite, inserted on a flat, rounded, hypogynous disk; filaments erect; anthers 2-celled, opening longitudinally. Ovary sessile, 1-celled, 3-4 lobed, usually with 3-6 parietal placenta; stigmas 3, glandular, sessile. Fruit dry and membranous, rarely succulent, opening at the apex; or apocarpous, with empty carpels round a central placenta. Seeds numerous, reniform, smooth or pitted; embryo taper, arcuate; albumen none, or scarcely any.

Herbaceous plants or rarely small shrubs, with alternate, entire or pinnately-divided leaves, and small, gland-like stipules. They are all natives of the countries surrounding the Mediterranean, with the exception of a very few species, one of which is peculiar to California. It is difficult to ascertain the exact station of this order, but as it agrees with the Capparidaceæ in its seeds, hypogynous disk, parietal placentæ and curved embryo, I have followed Lindley in placing it in the present group instead of the following.

The species are unimportant in a medicinal point of view, though some of them were formerly esteemed as endowed with considerable powers. The genus *Reseda* derives its name from a plant noticed by Pliny (lib. xxvii. c. 12), which was used as a topical calmant to abscesses, pronouncing at the same time the words *reseda morbus*. The *R. luteola* or Weld, a native of Europe and naturalized in some parts of the United States, affords a yellow dye for woollen stuffs, and has been known for a long time, being noticed by Virgil under the name of *Croceum luteum*. It was formerly considered to be diaphoretic and alexipharmic, and was employed as an antidote in snake-bites, and is also stated to be a powerful vermifuge, and to be the basis of Darbon's remedy against the tænia. The *R. phyteuma* is said by the old writers to be aphrodisiac, but is used as a garden vegetable by the modern Greeks. Lemery (*Dict.* 715), speaks of the *R. sesamoides* as a good vulnerary and detersive. The most celebrated of these plants is the *R. odorata*, so familiar under the name of Mignonette, for its fragrancy. The properties of the other species of this order have not been ascertained, but it is probable that they are inert, and of little value.

Order 13.—CISTACEÆ.—*Lindley.*

Sepals 5, persistent; two outer, small or wanting; three inner, imbricated. Petals 5, or by abortion 3 or more, caducous, hypogynous. Stamens indefinite, seldom few, distinct, hypogynous; anthers short, innate. Ovary of 3-5 connected carpels; styles and stigmas generally united. Pericarp 3-5 valved, 1-celled, with parietal placentæ, or 3-5 celled, with dissepiments arising from the centre of the valves. Seeds few or numerous. Embryo nearly straight or spirally convolute.

The Cistaceæ are herbaceous or small shrubs with simple, and generally entire leaves, which are opposite or alternate, the lowest always opposite, and in many cases having stipules. The flowers are red, white, and yellow, and are in some cases large and showy, but at others, very small and inconspicuous. They are found in most parts of the world, but the larger proportion of the species are natives of temperate climates.

The medical properties of the order are slight and unimportant; some of the species, however, furnish a resinous, somewhat balsamic product, particularly the *Cistus creticus*, from which the Ladanum is obtained. The *Cochlospermum gossypium* of India affords a gum called Kuteera, used as a substitute for Tragacanth. A decoction of the roots of *C. insigne* is

employed in Brazil in internal pains, and that of *C. tinctoria* in amenorrhœa, and as a yellow dye. The *Helianthemum vulgare* was at one time used as a vulnerary, and in the treatment of phthisis, and Kramer states that he has seen cures effected by it. The *H. canadense* is also employed by empirics in this country in scrofulous complaints, both internally in decoction, and externally as cataplasms.

Cistus.—*Linn.*

Calyx regular. Corolla with 5 equal petals. Stamens numerous. Style simple. Capsule 5-celled, many-seeded.

C. creticus, *Linn.*—Sepals lanceolate; leaves ovate, spathulate, rugose, without stipules.

Linn. *Syst. Veg.* 497; Richard, *Elem. d'Hist. Mat. Med.* ii. 743; De Candolle, *Prod.* i. 264; Lindley, *Flor. Med.* 131.

Common names.—Rock rose; Rose of Crete.

Foreign names.—Ciste de Crete, *Fr.* Cisto, Ladano, *It.* Cisten, *Ger.*

Fig. 77.

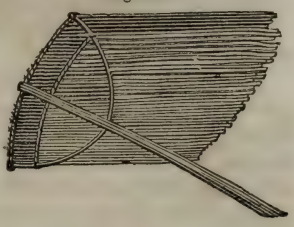
C. creticus.

Description.—A small shrub, with divaricate, pubescent branches, furnished with ovate, somewhat spathulate leaves, which are waved at their edges, and pubescent on both surfaces; they are supported on a broad and membranaceous petiole. The flowers are pedunculate, large, of a beautiful rose colour, and are generally in threes at the end of the branches. As in all the other species, they last but one day. The calyx has five ovate-lanceolate, pubescent sepals much smaller than the petals, and persistent. The stamens are numerous, of a golden colour. The pericarp is a globose, pubescent capsule, almost covered by the calyx, and opening by five valves.

It is a native of Syria, and of many of the islands of the Mediterranean Archipelago, growing in dry and stony situations, and cultivated elsewhere for the beauty of its flowers. From it and other species of the genus, a resinous substance is collected, known under the name of *Ladanum*. This is a natural exudation from the plant, and is obtained for use in a variety of modes. In former times, it is stated by Dioscorides, it was collected by combing the beards of goats which had browsed upon the plant. At present, the usual plan is to beat or brush the bushes by means of a kind of rake, formed of a double row of leathern thongs; to these the resin adheres, and is after-

wards removed by scraping them with knives. As found in commerce, it is very impure, containing a very large proportion of dirt and sand. When pure, the smell is balsamic and agreeable, and the taste somewhat bitter and aromatic. It is insoluble in water, but is almost wholly dissolved by alcohol. According to Guibourt, it consists of resin and volatile oil, 86 ; wax, 7 ; aqueous extract, 1 ; impurities, 6. This analysis being of the pure article, differs widely from that of Pelletier, who examined this substance as usually found in the shops, which afforded him but 20 of resin, whilst there was 72 of sand and impurities.

Fig. 78.



Ladanum Rake.

Ladanum is now but seldom used as a medicinal agent, though it was formerly in some repute as an ingredient in several stimulating plasters, ointments, and theriacs. Its principal employment is in perfumes, and as a constituent in aromatic pastilles.

Group VII.—Violales.

Order 14.—VIOLACEÆ.—*De Candolle.*

Sepals 5, persistent, produced at base. Petals 5, alternate with the sepals, hypogynous, usually unequal, the upper one generally spurred or saccate at base. Stamens 5, alternate with the petals, inserted on the hypogynous disk, filaments dilated and projecting beyond the anthers, two of them usually with a gland at base. Anthers 2-celled, innate, introrse, opening longitudinally. Ovary 1-celled, of 3 united carpels, with 3 parietal placentæ. Style sometimes declined or curved, with an oblique cucullate stigma. Pericarp a 1-celled, 3-valved, many-seeded capsule. Seeds often with a tumour at base, and a horny testa. Embryo straight in the axis of a fleshy albumen.

The Violaceæ consist of herbs or shrubs, with simple, petiolate, generally alternate leaves, having two stipules. The roots of almost all of them are nauseous and emetic. The species of Viola are most numerous in temperate climates, whilst those of Ionidium are almost peculiar to South America, where many of them are known under the name of Ipecacuanha.

Viola.—*Linn.*

Sepals 5, unequal, more or less appendaged at base. Petals 5, unequal, the upper (by re-supination the lower) calcarate at base. Stamens approximate, filaments distinct. Anthers connate. Capsule bursting elastically.

This extremely numerous genus is composed of small herbaceous plants, which are mostly perennial, having a fleshy rhizome or subterraneous stem, or a visible stem and fibrous roots. The leaves are alternate. The flowers are solitary on angular peduncles, and generally blue, yellow, or white. De Candolle enumerates many species, of which over 30 are natives or have become naturalized in North America. The derivation of the name is not known, but many conjectures have been hazarded by etymologists, all of which are rather fanciful than just; thus one says it is indicative of the powerful scent of the plant, "a vi olendi;" another insists that it is a diminutive of *via*, because "quod juxta vias nasci amat." Whatever may be its derivation, the plant has been known from the earliest ages, both as a theme for the poet and as a medicinal agent.

V. odorata, *Linn.*—Stemless. Leaves cordate, smooth as well as the footstalks. Sepals obtuse. Lateral petals with a hairy line in the centre.

Linn., *Sp. Pl.*, 1324; *Engl. Bot.*, ii. 619; Stokes, *Bot. Mat. Med.*, ii. 440; Stephenson and Churchill, i. 29; Lindley, *Flor. Med.*, 97.

Common Names.—Violet, Sweet Violet, Garden Violet.

Foreign Names.—Violette odorante, *Fr.;* Viola mammola, *It.;* Blaue veilchen, *Gr.*

This Violet is a native of every part of Europe, and is also found in many parts of Asia; it is not indigenous to the United States, but has become naturalized in some places. It is well known as occupying a place in every garden, on account of the early appearance and fragrance of its flowers. There are numerous varieties, both as regards colour and the multiplication of the petals. The Violet is mentioned by Homer, Theophrastus, and most of the ancient writers; but it has been stated by Lord Mahon (*Letter to the Antiquarian Soc.*) that the Violet of these authors was a species of Iris, and that this latter plant is still called *viola* in Sicily. His arguments, however, are far from satisfactory, and any evidence drawn from the name is applicable to numerous other plants besides the Iris, as the Italians term a variety of sweet-smelling plants *viola.*

The odour of the Violet is extremely pleasant and grateful to most persons, but is repugnant and even injurious to some individuals, causing headache and vertigo; and Triller reports a case where it caused apoplexy in an old lady. The Violet at one time enjoyed a high reputation as a remedial agent, but is now only used in the preparation of a syrup from the flowers, which is a mild laxative and demulcent; but is still more employed by chemists as a reagent in the detection of acids and alkalies. The seeds are also somewhat purgative; and Bichat states that three or four drachms of them, made into an emulsion with sugar and water, acts as a mild and pleasant purgative. The roots are possessed of far more energetic properties, being emetic and purgative, in about the same doses as ipecacuanha, for which they have been proposed as a substitute; but they have the disadvantage of being uncertain in their effects, sometimes acting very powerfully, and at others producing little or no impression. They owe this power to the presence of a peculiar principle, discovered by Boullay in every part of the plant, but principally in the roots and seeds, and which he calls *violine.* This is closely allied to emetine in composition and action, and was at one time considered as identical with it.

Several other species of violet have been used in medicine, and have been spoken of in high terms by different writers. One only is officinal in our national Pharmacopœia, the *V. pedata*, a native of the United States, and remarkable for the size and beauty of its flowers and its many-parted leaves. It has been successfully employed as an expectorant and demulcent, and may be considered an equivalent to the *V. odorata* of Europe. Much stronger testimony has been adduced of the powers of two of the caulescent species, the *V. arvensis* and *V. tricolor*, more especially by German writers. These two plants long enjoyed the reputation of being excellent depuratives, but were not fully experimented with until Strack made them the subject of a dissertation in 1776. Since then the observations of Metzer, Ploucquet, and others have shown that they are possessed of much efficacy in the treatment of cutaneous diseases, and especially of that obstinate and unpleasant eruption, *crustea lactea.* On the other hand Alibert denies their powers; but it does not appear that his opinion is founded on actual experiment. The fresh plant, or its juice, is to be used, as drying destroys its active qualities. Strack states that when this remedy has been taken for some time, the urine becomes extremely fœtid, smelling like that of the cat. According to Bergius, these plants are extremely mucilaginous, an ounce and a half in twelve

of water producing a consistent jelly. From the strong proofs brought forward of the efficacy of these plants in the treatment of chronic diseases of the skin, they well deserve a further trial, and as the *V. tricolor* is to be found in every garden, the fresh herb can always be procured.

Ionidium.—*Ventenat.*

Sepals small, membranaceous at margin, unequal. Petals unequal, marcescent. Stamens five, approximate. Filaments short, dilated, bearing the anthers near the base. Ovary sessile, 1-celled, 6-seeded. Style declined. Pericarp 3-valved, with a loculicidous suture. Seeds shining, truncate at apex.

The species composing this genus was formerly included in Viola, until separated by Ventenat. They are herbaceous or suffruticose plants, mostly peculiar to South America, two species only occurring in the United States. It was at one time supposed that the Ipecacuanha was the product of one or more plants of this genus, as the roots of the whole or of the greater number of them are endowed with analogous properties, and are much used as substitutes in Brazil. The most prominent of them are the *I. ipecacuanha*, *I. parviflorum*, and *I. microphyllum*.

I. ipecacuanha, *Linn.*—Hirsute. Stem erect, herbaceous. Leaves alternate, lanceolate, acutely serrate. Peduncles bibracteate, axillary, solitary. Calyx glandular, dentate.

Aublet, *Guian.* 313; Ventenat, *Malm.* 23; Martius, *Spec. Mat. Med. Bras.* 14; Lindley, *Flor. Med.* 98.

Description.—Root perennial, ligneous, perpendicular, four to six inches in length; the old roots about the size of the little finger, the younger about that of a goose-quill. Stem cylindrical, branching, somewhat pilose. Leaves alternate, obovate, acute, dentate, on a short petiole, and having two linear stipules at base. Flowers pedicellate, solitary, with two or three small, linear bracts. Calyx hairy, glandular. Corolla irregular, two upper petals narrow, and not longer than the sepals, the two lateral broad and twice the length, the inferior still longer. Stamens distinct. Anthers not connate, having a membranaceous appendage at their apex. Pericarp almost triangular, 1-celled, 3-valved.

This species occurs very plentifully in sandy soils in Brazil, Colombia, and some of the West Indian islands, flowering in July and September. It is known in Brazil under the name of *Ipecacuanha branca*, or white vomiting root, and is much prized by the inhabitants as an emetic. Martius states that he often observed large parcels of it dried and kept for use. The mode of preparation is to shave the cortical portion from the root, and infuse it in water for twelve hours; the dose of the infusion is from half a drachm to a drachm, in which quantities it acts mildly, but with much certainty. This root has been known in commerce under the name of white Ipecacuanha, and is sometimes to be found mixed with the true article, but may always be distinguished from it, by its want of the rings so characteristic of the genuine drug. Its properties, however, seem almost identical with the real Ipecacuanha, and the analysis of it by Richard shows that its chemical composition is very analogous to it. A sufficient number of experiments have not been made with it to establish its exact value, but it would appear from all that is known respecting it, that it might be used instead of the true Ipecacuanha, without inconvenience.

Fig. 79.

Root of I. ipecacuanha.

2. I. MICROPHYLLUM, *Humb.*—Stem procumbent, shrubby. Leaves ovate. Stipules longer than the petioles. Peduncles with a hairy line on one side, longer than the leaves.

Lindley, *Flor. Med.* 98; Bancroft, *Comp. to Bot. Mag.* i. 278; *Amer. Jour. Pharm.* vii. 186, viii. 125.

Description.—Root ligneous, round, tortuous, much-branched. Stem somewhat shrubby, procumbent, round, tubular, the branches pubescent on two of their sides. Leaves alternate, oval, cuneate at base, serrate, with the apex of the teeth glandular. Petioles short. Stipules longer than the petioles, ovate, lanceolate. Flowers on solitary, axillary peduncles, which are longer than the leaves, with a single line of pubescence. Calyx persistent; the sepals smooth, ovate, acute. Corolla very unequal, marcescent, the lower petal much longer than the others. Stamens distinct, with the anthers near the base, and expanding above into an ovate membrane, which surrounds the style. Anthers destitute of glands. Capsule somewhat trigonal, 1-celled and 3-valved, few-seeded. Seeds globose-ovate, dark-brown, shining.

Some years since the attention of the profession was excited by statements that a discovery had been made in South America of a plant which had proved eminently beneficial in the treatment of elephantiasis and leprosy, and a long essay on the subject was published by Dr. Bancroft in the Jamaica Physical Journal, in which he cites numerous cases in corroboration of its powers, and describes it as a species of Ionidium, under the specific name of *Marcucci*, deeming it to be new; from specimens sent to Dr. Lindley, however, it appears that it had previously been noticed by Humboldt under the name of *microphyllum*, whilst Sir Wm. Hooker received specimens which proved to be *I. parviflorum*. About the same time Professor Mütter, of this city, obtained specimens, and shortly afterwards we were favoured by the late Dr. Hulings with dried specimens, a drawing of the plant, a report made to the Colombian government on the subject, and directions to aid in the search for it. From all these sources, it appears evident that more than one plant is known in South America, under the local name of *Cuichunchulli*. The drawing represents the *I. microphyllum* of Humboldt; and the specimens received by Dr. Mütter were the same, as were also those sent to Dr. Lindley; those we obtained were principally of *I. parviflorum*, with a few of the other, and the official description alluded to clearly points out that species. As the virtues of both appear to be identical, and as they are indiscriminately used for the same purposes, this discrepancy of opinion is of little consequence in a practical point of view, however interesting a proper discrimination of the respective species may be to the botanist.

From Dr. Bancroft's essay and the official report, it appears that the remedial properties of a certain root, known by the natives under the name of *Cuichunchulli*, in the cure of elephantiasis, were well ascertained, but were not communicated to the Spaniards until about the middle of the last century, when they were made known to a Jesuit in Cuenca, but attracted no attention until 1829, when an account was published in a newspaper published at Bogota; this induced a trial of its powers in several cases of elephantiasis and other cutaneous disorders, which was attended with the most marked benefit to the patients. It is given in doses of half a drachm, in substance or infusion, every two or three hours; this causes a copious flow of urine and numerous alvine evacuations, and by a continuance of the medicine, the natural functions of the skin are gradually restored. Although its full powers and real efficacy have not been sufficiently tested, it is evident that it closely resembles the *Madur* (*Culotropis*) of the East Indies in its properties, as well as those of the Apocynum; they all act as emeto-purgatives in the first instance, and afterwards display strong diuretic qualities.

The analysis of the *I. ipecacuanha* by Richard, already alluded to, shows that these plants owe their emetic property to the presence of Emetine; their other qualities are probably to be attributed to a peculiar extractive matter, soluble in water, and which exists in large proportion in the root.

Several other species of Ionidium are used medicinally by the natives of South America, the principal of these are: the white Ipecacuanha of China, *I. heterophyllum*, VENT.; this has slender, white, tortuous, nauseous roots: white Ipecacuanha of the Galipous, *I. hybanthus*, VENT.; this is generally known in Brazil by the name of *Poaya*. The roots are white, slender, twisted and interlaced, and of a disagreeable taste and smell. White Ipecacuanha of Guiana, *I. calceolaria*, VENT.; in this the roots are slender, nodose, tortuous, striated longitudinally, yellowish-gray; the taste is at first mucous, and afterwards somewhat acrid and bitter; it is emetic in doses of 30 grs., and purgative in those of 40. Ipecacuanha of St. Thomas, *I. strictum*, VENT.; the roots somewhat resemble those of the true Ipecacuanha, *I. polygæfolium*, VENT. *I. poaya*, ST. HILAIRE, called in Brazil *Poaya do campo*; the root is tortuous and annulated: emetic in doses of 25 to 30 grs. *I. brevicaule*, MARTIUS. *I. urticæfolium*, MARTIUS. All these and many others are employed as substitutes for the genuine Ipecacuanha, and act in a similar manner, except that they are more apt to affect the bowels.

ORDER 15.—FLACOURTIACEÆ.—*Lindley.*

Sepals 4-7, slightly cohering at base. Petals equal in number to the sepals, and alternate with them or wanting. Stamens hypogynous, equal in number to the petals or some multiple of them. Ovary roundish, sessile or slightly stipulate, free, 1 or more celled, with 2 or more parietal placentæ; style filiform or wanting; stigmas several, more or less distinct; ovules attached to the surface or sides of the placentæ. Fruit 1-celled, either fleshy and indehiscent, or capsular, with 4 or 5 valves, the centre filled with a thin pulp. Seeds indefinite, usually enveloped in a pellicle formed by the withered pulp. Albumen fleshy, somewhat oily; embryo straight, with the radicle turned to the hilum; cotyledons foliaceous, flat.

The species of this order are shrubs or small trees, with alternate simple leaves on short petioles, with no stipules, of a coriaceous texture and often marked with transparent dots. They are natives of tropical climates with the exception of a few occurring in New Zealand, &c.

The fruits of several of the *Flacourtias* are edible, having a pleasant subacid taste. According to Ainslie (*Mat. Med.* ii. 407), the leaves and shoots of the *F. cataphracta* have a taste not unlike that of rhubarb, but without bitterness; they are considered as stomachic, and in a slight degree astringent, and are prescribed in India in diarrhœa, general weakness, and phthisis; and in Behar an infusion is given in cases of hoarseness. An infusion of *F. sepiaria* is said by Dr. Wight to be useful in bites of snakes, and the bark infused in oil so as to form a liniment, is employed on the Malabar coast as a remedy in gout. Several other plants of the order are possessed of active properties, but no definite account has been given of their application or uses.

The most important of the species is the *Bixa orellana*, the angular seeds of which are covered with an orange-red pulp or pellicle; this, when separated and prepared, is the Arnotto of the shops, so much used in the arts. It is a native of South America and the West Indies, and is cultivated in India. Arnotto is prepared by rubbing the seeds in water, and then strain-

Fig. 80.

B. orellana.
1. Flower. 2. Petal. 3. Pistil. 4. Section of seed. 5. Fruit.

ing; the pulpy mass is then worked well with the hands and dried. When of good quality it is dry, easily broken, of an unpleasant smell, and of a reddish colour. It is used in dyeing, but its tints are very fugitive, and are destroyed by acids and alkalies. It is also added to several preparations of chocolate and is constantly employed to colour cheese, and in Java it forms the basis of a drink.

It was at one time used in medicine as a stomachic and mild purgative, and is still in some estimation in South America as a cordial, astringent and febrifugal remedy in dysentery. Bomare observes, but without citing any authority for the assertion, that it is an antidote to the poison of the manioc. It has been analyzed by John (*Ann. de Chim.* lxxxviii. 99) and by Bousingault (*Ibid.* xxviii. 440). In corroboration of these statements, there is the authority of Dr. Macfadyen, who says that the seeds are a gentle purgative, and have been used with advantage in dysentery, and also that it is thought to be an antidote to the poison cassava. (*Flor. Jam.* 42.)

Order 16.—PASSIFLORACEÆ.—*Lindley.*

Sepals mostly 5, sometimes irregular, combined into a tube of variable length, the sides and throat being lined with filamentous or annular processes. Petals 5 arising from the throat of the calyx, sometimes wanting, or irregular. Stamens 5, monadelphous, rarely indefinite, and adhering to the stalk of the ovary; anthers extrorse, linear, 2-celled, with a longitudinal dehiscence. Ovary on a long pedicel, superior 1-celled; styles 3, arising from the same point, clavate; stigmas dilated; ovules indefinite, anatropal, parietal. Fruit stalked, 1-celled, with 3 parietal polyspermous placentæ, sometimes 3-valved. Seeds attached in several rows to the placentæ, with a brittle sculptured testa, surrounded by a pulpy aril; embryo straight, in the midst of a fleshy thin albumen; cotyledons foliaceous, flat.

Fig. 81.

Different species of Passiflora.

This order consists of herbaceous or shrubby plants, usually climbing by tendrils, and having alternate, entire or palmately-lobed leaves, mostly furnished with stipules, and often glandular. The flowers are axillary or terminal, often with a 2-leaved involucre. The species are most abundant in the warm regions of America, but are also found in Asia and Africa, and one or two in the United States as far north as Virginia. The fruits of many of them are eatable, especially those of the *P. quadrangularis* or Granadilla, the *P. laurifolia*, *cærulea*, *coccinea*, *&c.*, and are much esteemed in their native countries. In a medical point of view, they are also of some interest, being possessed of active qualities capable of fulfilling a variety of indications; though it should be noticed that our information in regard to them is far from definite. The only memoir on the subject deserving of notice is that of Dr. Ricord Madiana (*Jour. de Pharm.* xvii. and *Ann. Lyceum Nat. Hist.* i.) on the *P. quadrangularis;* a decoction of the root of this, he found to be poisonous, acting like a narcotic; he discovered in it a peculiar principle which he calls *Passiflorine*. Martius states that this root is emetic, but if it possess the powerful narcotic powers spoken of by Dr. Ricord, its use would be dangerous; it may be mentioned that this writer says that a decoction of the *Cecropia peltata* is an antidote to it.

The *P. contrayerva* is said to be alexipharmic and carminative, and according to Brown, (*Hist. Jamaica,*) a tincture of the flowers of the *P. rubra* is used in Jamaica as a substitute for laudanum. The *P. fœtida* and some closely-allied species are esteemed pectoral, and are said by Poupée-Desportes to be antispasmodic and emmenagogue. The leaves of the *P. laurifolia* are administered in the dose of one or two drachms as a vermifuge in some of the West Indies (*Labat. Nouv. Voy.*) The fruit of the *P. lyrifolia* is considered to be cooling and aperient, and is given in fevers, cutaneous affections, &c., whilst a decoction is in some esteem as a diuretic. (*Flor. Med. des Antill.* iv. 97.)

Some of the other genera of this order afford edible fruit, among which may be noticed several species of *Tacsonia* and *Paropsia*. The *Murucuja ocellata*, a South American plant, is reputed to be anthelmintic, diaphoretic, and anti-hysteric; it, with some other species, is highly spoken of by Piso (*Bras.* 107) for these purposes, and he also states that the bruised leaves relieve the pain in hæmorrhoids.

Order 17.—SAMYDACEÆ.—*Lindley.*

Sepals 4–5, more or less coloured, somewhat cohering at base, æstivation imbricate, seldom valvate. Petals wanting. Stamens inserted on the calyx tube, 2–4 times as many as the sepals; filaments monadelphous, either all bearing anthers, or alternately shorter, villous or ciliated, with alternate, erect, 2-celled anthers. Ovary superior, 1-celled. Style single, filiform, with a capitate or slightly-lobed stigma. Capsule coriaceous, 1-celled, 3–5 valved, many-seeded; valves with an imperfect dehiscence, often somewhat pulpy within and coloured. Seeds adhering to the valves, on the papillose or

pulpy part, with a fleshy aril and excavated hilum; albumen fleshy or oily; embryo large, in the middle of the albumen. Cotyledons ovate, radicle pointing to end remote from the hilum.

Trees or shrubs, with alternate, often somewhat distichous, simple, entire, or dentated evergreen leaves, mostly having pellucid markings, and furnished with stipules. They are all natives of tropical climates, and principally American. The bark and leaves of most of the species are astringent. The leaves of *Cascaria ulmifolia* are employed in Brazil as a remedy in snake-bites, both externally and internally; and those of *C. lingua* are esteemed, in the same country, in the treatment of malignant fevers and inflammations. In India, a decoction of the leaves of *C. anavinga* is thought to be beneficial as a warm fomentation in rheumatism and pains of the joints; and the juice of the fruit is said to be a powerful sudorific, and also to act on the bowels. The roots of *C. esculenta* are bitter and purgative, but the leaves are edible.

Group VIII.—Guttiferales.

Order 18.—DIPTERACEÆ.—*Lindley.*

Calyx tubular, 5-lobed, unequal, persistent, and afterwards enlarged at base; æstivation imbricated. Petals hypogynous, sessile, often united at base, with a valvate æstivation. Stamens hypogynous, indefinite, distinct, or somewhat and irregularly polyadelphous. Anthers innate, subulate, with a longitudinal dehiscence near the apex; filaments dilated at base. Ovary superior, 3-celled. Ovules in pairs, pendulous. Style single. Stigma simple. Fruit coriaceous, 1-celled by abortion, 3-valved or indehiscent, surrounded by the calyx, which has tough, leafy, enlarged divisions, crowning the fruit. Seeds single, with no albumen.

This order is composed of large trees, abounding in resinous juices, and furnished with alternate leaves, having deciduous, oblong, convolute stipules. The flowers are generally large. They are peculiar to India and its archipelago, where they form the largest trees in the forest. They all are replete with a balsamic juice, which concretes in various forms. Thus the *Dryobalanops aromatica* affords one of the kinds of camphor. The *Vateria indica* furnishes the East Indian copal or Gum Anime. Blume states that the resin of the *Dipterocarpus trinervis* forms an excellent material for plasters, and made into an emulsion, with the yolk of an egg, is a good substitute for copaiva in inflammations of the mucous membrane (*Flor. Javæ*). Some other species of the same genus furnish balsams which have similar properties. The *Shorea robusta*, which affords the best and most extensively used wood in India, also produces a resin used as incense in the temples, and likewise it is much employed as pitch, under the name of Dammer.

Fig. 82.

S. robusta.

Dryobalanops.—*Gærtner.*

Calyx 5-sepaled. Sepals long, ligulate, scarious, united at base. Corolla 5-petaled. Fruit 3-valved, 1-celled. Seed solitary. Embryo inversed, without a perisperm.

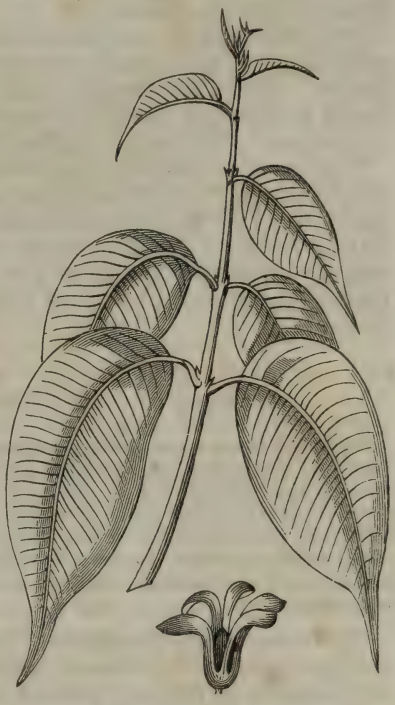
This genus was established by Gærtner, but was not acknowledged until

the description given of it by Mr. Colebrook, in the Asiatic Researches, showed that it had been erected on sufficient grounds. His views were confirmed by the full account of it by Mr. Jack, in the Malayan Miscellanies. The genus *Shorea* of Roxburgh, if not identical with it, is very closely allied.

D. AROMATICA, *Gært.*—Leaves elliptical, alternate and opposite, stipulate. Flowers terminal and axillary.

Gærtner, Blume, *Fl. Jav.* 8; Lindley, *Flor. Med.*, 146; *Shorea camphorifera*, Roxburgh, *Fl. Ind.*, ii. 616; *D. camphora*, Colebrooke, *Asiat. Research.*, xii. 539; Jack, *Malay. Miss.*, i. 5; Stephenson and Churchill, iii. 170.

Fig. 83.



D. camphora.

Description.—The Sumatra Camphor-tree is very lofty and striking in its appearance; it often attains a height of ninety feet, with a trunk of six or seven in diameter, covered with a brown bark. The leaves are opposite below, and alternate above, elliptical, obtusely acuminate, entire, smooth, supported on short petioles and furnished with subulate, caducous stipules, in pairs. The flowers are terminal and axillary, forming a kind of panicle at the ends of the branches. The calyx is composed of five linear, lanceolate, spreading sepals, united below. The corolla is 5-petaled, longer than the calyx; the petals are ovate-lanceolate, and somewhat connected at base. The stamens are numerous, with the filaments monadelphous. The anthers are nearly sessile, within the mouth of the tube, and terminate in membranous points. The ovary is superior, ovate, and bears a slender, filiform style, longer than the stamens and crowned by a capitate stigma. The capsule is ovate, fibrous, woody, longitudinally grooved, surrounded below by the persistent calyx, 1-celled and 3-valved. The seed is solitary, thin, membranaceous. The embryo is contained in an interior fold of the cotyledons.*

This tree is found in great abundance in the forests of Sumatra and Borneo, and is said to flower but once in three or four years. It was at one time supposed that the only plant furnishing camphor was the *Laurus camphora* of Linnæus, but the researches of Mr. Colebrooke, and those of Mr. Jack, (*Malayan Miscellanies*,) have conclusively shown that the tree under consideration furnishes a product which is far more highly esteemed in the East, but as it has been found only in a limited district in Sumatra and in Borneo, added to the difficulty of obtaining the produce, its price is very exorbitant, being 78 times that of the Japan or common camphor. It was long since stated that the Chinese knew of two varieties of this drug, and Kæmp-

* Dr. Lindley is of opinion that this plant is not truly a *Dryobalanops*, and that the figure in Stephenson and Churchill, of which our cut is a copy, cannot be intended for it.

fer has remarked that the camphor found in a concrete state in the cavities and fissures of the trunk of a tree in Borneo and Sumatra, was different from that of the Laurus.

According to the authorities above quoted, the Camphor is found in a solid state, occupying portions of about a foot or a foot and a half in the heart of the tree. In searching for it the natives make a deep incision in the trunk about fourteen or eighteen feet from the ground, and if it is found to contain camphor, the tree is cut down and divided into pieces about three feet long, in order to permit the gum to be extracted. The same tree also yields an oil or liquid camphor which is even more esteemed in eastern countries than the camphor itself; to obtain this it is merely necessary to wound or pierce the tree. The product of a middle-sized tree is about eleven pounds, though some furnish double that quantity.

The Dryobalanops camphor occurs in small fragments of crystals; these are transparent, brittle, harder than the Laurus camphor, and do not sublime as readily. The oil is sometimes limpid and colourless, but usually is of a yellowish or brownish colour. Its smell resembles that of Cajeput, but is more camphorated. It is used principally in making scented soap.

This camphor probably possesses the same properties as the camphor of the shops, which will be noticed under the appropriate head, (see *Camphora officinarum*,) but as no trials have been made with it in Europe or this country, nothing certain is known of them. In the East, as before mentioned, it is infinitely preferred to the Japan kind, and Ainslie states that it is the most frequently employed in India, and the Chinese attribute the most extraordinary virtues to it.

Order 19.—TERNSTROMIACEÆ.—*Lindley.*

Sepals 3–5 concave, coriaceous, persistent, the innermost often largest, æstivation imbricated. Petals mostly 5, hypogynous, alternate with the sepals, often united at base. Stamens indefinite, inserted on the petals; filaments usually cohering in one or more parcels at base; anthers adnate or versatile. Ovary 2–7-celled, usually sessile on a discoid torus; ovules 2 or more in each cell; styles 2–7, distinct or combined. Fruit 2–7-celled, capsular, baccate, or coriaceous and indehiscent. Seeds commonly few and large, albuminous or exalbuminous. Embryo straight or curved; cotyledons often large, and containing oil.

This order, which includes the Theaceæ of some authors, is composed of trees and shrubs, with alternate, mostly coriaceous, exstipulate leaves, which are sometimes marked with pellucid dots. The flowers are large and showy, on axillary and terminal peduncles. The order, though a small one, is remarkable for the importance of some of the plants contained in it; among these the Tea stands pre-eminent, both as an article of commerce and also in a medical point of view. It also contains the Camellia, so esteemed for the beauty of its flowers, and for the oil extracted from its seeds, and those ornaments of the American forest, the Gordonias and Stuartias.

Thea.—*Linn.*

Sepals 5–6, rounded. Petals 6–9, sessile. Stamens numerous. Capsule 3-celled, 7-valved, each cell containing one to two seeds, and opening at the upper part.

This genus derives its name from its Chinese appellation, and in a commercial point of view, is one of the most important of the vegetable kingdom. But notwithstanding this importance, and the numerous notices of it, and its cultivation, no little uncertainty exists whether it contains one or more

species, or in other words, whether the black and the green teas are the product of the same or of different species. Linnæus, who established the genus, distinguished two species, the *T. bohea* having six petals, and the *T. viridis*, having nine; and Loureiro, who spent a long time in the East, recognised three others, the *T. oleosa*, *T. cantoniensis*, and *T. cochinchinensis*, but many modern botanists are of opinion that all these are but varieties of one species, which has therefore received the name of *T. sinensis*.

Sir Wm. Hooker, (*Bot. Mag.* 3148,) is decidedly of opinion that there are two distinct species, which maintain their peculiar characters even under long cultivation, and this is corroborated by the observations of Mr. Royle (*Illustrations*, 109); at the same time it is admitted although each of these species furnishes a peculiar leaf, or in other words, that one affords the green and the other the black tea of commerce, yet both can be made from the same plant according to the mode of manufacture. Dr. Abel, (*Narrative of a Journey*,) says, "From persons conversant with the Chinese method, I learnt that either of the two plants will afford the black or green tea of the shops, but the broad, thin-leaved plant, (*T. viridis*,) is preferred in making green tea." This statement is corroborated in a letter from Mr. Millett, of Canton, written to and cited by Sir Wm. Hooker; he states: "Of the plants there are two kinds, of which one has a leaf of a much darker colour than the other. This difference may partly arise from cultivation; but it is to the various modes of preparation that the green and black teas of the shops are due. In proof of this, we sent home last year, green tea from the black tea plant. You may therefore conclude, that though there are two plants, differing as much in appearance and growth as any two varieties of the *Camellia japonica*, each by proper management will produce black or green tea indifferently." This accords, in every particular, with the observations of Mr. Royle.

With this testimony, and the remark of Dr. Lettsom, that after an examination of many hundred flowers, both from the Bohea and green tea districts, he was convinced that their botanical characters were uniform, I am inclined to think that but one species of the tea plant has been described, and that the *viridis* and *bohea* are merely varieties, more especially as we find far more marked variations in all cultivated plants; thus not to mention others, many of the acknowledged varieties of the genus most closely allied to the tea, the *Camellia*, are far more unlike each other than the two kinds of tea. And it may be added that, although Loureiro described three additional species, he states that he is inclined to believe that of the tea proper there is but one true species; and Kæmpfer's figure of the Japanese tea plant, is that of the *T. bohea* and not the *viridis*. I shall, therefore, consider them as constituting but varieties of a single species.

T. SINENSIS, *Richard.*—Characters those of genus.

a. *Viridis*, *Linn.*—Leaves ellipto-lanceolate, undulate; flowers axillary, solitary.

Linn. *Spl. Pl.* 735; Woodville, *Supp.* 116; Hooker, *Bot. Mag.* 3148; Lindley, *Flor. Med.* 120.

Common Name.—Green tea.

Foreign Names.—Thé vert, *Fr.;* The verde, *It.*

b. *Bohea*, *Linn.*—Leaves smaller, coriaceous, dark-green; flowers axillary, aggregated.

Linn, *Spl. Pl.* 735; *Bot. Mag.* 998.

Common Name.—Black tea.

Foreign Names.—Thé noir, *Fr.;* The nero, *It.*

Description.—A shrub or small tree, which in a state of nature may attain a height of twenty-five or thirty feet, but which, when cultivated, seldom exceeds five or six. The leaves are alternate, with short petioles, very smooth, ovate-oblong, somewhat acuminate, stiff, and coriaceous, slightly dentate and shining. The flowers are white, axillary, and either single or aggregated, on short glabrous peduncles. The calyx is persistent, short, with five ovate, rounded, obtuse divisions. The corolla, which is much larger than the calyx, consists of from six to nine, somewhat unequal, rounded, very concave petals. The stamens are very numerous, rather shorter than the corolla, with subulate white filaments, bearing rounded, reniform anthers, opening at the sides. The ovary is ovate, downy, surrounded by a fleshy ring at base, three-celled, each cell containing two ovules. The styles are three, united below, free above, with obtuse stigmas. The fruit is a three-celled capsule, each cell containing one, sometimes two seeds.

Fig. 84.

T. sinensis.

The native country of the tea is the Eastern part of Asia; it is cultivated in China, Japan, and the adjoining districts and islands, and has also been introduced into Assam and Brazil, in both of which countries it has been found to grow luxuriantly. It is, however, a plant of the temperate zone; the tea districts in China are thus described by Dr. Abel: that of the Green between 29° and 41° N., and of the Black within the 27th and 28th degree N. The green variety is, therefore, almost a hardy plant, whilst the other will not endure the frosts of winter.

The different kinds of tea of commerce, as known in Europe and this country, are very numerous, but are far exceeded by those recognised in China. They are all referable to the two great divisions of green and black. The quantity of tea produced in China must be enormous; for the whole supply of the world is derived from that country, as little or no commerce exists with Japan, Cochin China, &c., and though the cultivation of the plant has succeeded in Brazil and Assam, the amount of tea produced has been very small. In China it may be calculated that it is cultivated over a square area of upwards of a million of miles. The tea harvest is said to take place twice a year: the first in the spring, and the last about September. The first gathering affords the finest qualities. The leaves are carried in baskets to the drying-house, and thrown in small quantities on iron plates, heated by small furnaces, and rapidly shifted about that they may not scorch; when they begin to curl, they are removed and placed on a table, where they are

rolled and rapidly cooled so as to twist or curl properly. These operations are repeated until the leaves are quite dry. The coarser leaves of the last gathering are steamed so as to soften them, previous to subjecting them to the heating process. After being perfectly cured, they are packed in baskets, and again dried before being finally put in chests for exportation.

The use of tea in China is of very ancient origin. According to the Japanese tradition, a holy man by the name of Darma, visited China about the year 516, to instruct the natives in the duties of religion. He led a life of great abstinence, and especially denied himself the comforts of rest; but having been worn out, he fell asleep; as a penance for this transgression, he cut off his eyelids and threw them on the ground; each became a tea plant, and Darma, having discovered the virtues of the shrub, recommended the use of it to his disciples.

The first account received in Europe of this article was that of Lynschot, who states that the Japanese prepare a drink from an herb, which they offer to their guests as a mark of high consideration. Caspar Bauhin speaks of it in his "Pinax" under the name of *Cha*. About the commencement of the seventeenth century, it was brought by the Dutch to Europe as an article of commerce, but it was some time before it was generally used, as the sales of the East India Company, about a hundred years since, did not amount to more than 50,000lbs., whereas, at present, the sales reach to twenty-eight or thirty millions. In 1666 it sold for 60 shillings a pound, so scarce and valuable was it at that period. Next to Great Britain, the greatest consumption of tea is in Russia and the United States. That imported into Russia is said to be far superior to any which has been subjected to the heat and delay of a long voyage. In the Asiatic portions of that great Empire a kind of tea is used which is unknown in other countries; this is what is termed Brick tea, and is said to consist of old and damaged leaves and stalks, moistened, pressed into moulds, and then dried in an oven. In France, and the southern parts of Europe, the consumption of tea is very small, nor has it been much increased for many years past.

Medical Properties, &c.—Volumes have been written for and against this article; some authors attributing to it the most pernicious qualities, such as inducing nervous tremors, dyspepsia, dropsy, &c., whilst others again have been as lavish in its praise. That the use of tea may be abused, there can be no doubt, but it is equally certain that a moderate employment of it, and especially of the better kinds of black tea, (which it may be noticed is the only kind used by the Chinese,) far from being prejudicial, has a positive power in calming nervous irritation and aiding the digestive functions, and giving, after fatigue, a new life and tone to the system. The green tea is very apt to affect the nervous system of those unaccustomed to its use, but at the same time it does not appear that its constant employment is attended with any ill effects.

Tea is not used as a medicinal agent, properly speaking, though it is often given warm, to aid in the production of diaphoresis, but does not seem to have any greater power than any other mild infusion. From several analyses made of it, it is shown to consist of a bitter extractive, mucilage, resin, gallic acid, tannin, and a peculiar principle called *Theine*, on which its properties depend. This substance, which is also found in coffee and chocolate, as well as in the *Maté*, is a highly azotized principle, and has probably a much greater influence on the system in aiding the assimilation of food than is generally supposed, and hence the great use made of the various plants containing it, by almost all nations.

Order 20.—CLUSIACEÆ.—*Lindley.*

Flowers hermaphrodite or unisexual. Sepals 2—6, usually persistent, æstivation imbricated. Petals hypogynous, 4—10. Stamens numerous, distinct, or combined in one or more parcels. Filaments unequal. Anthers adnate, introrse or extrorse. Torus fleshy, sometimes 5-lobed. Ovary solitary, superior, 1 or many-celled. Ovules solitary, erect. Style none or very short. Stigma peltate or radiate. Fruit dry or succulent, 1 or many-celled, 1 or many-seeded, dehiscent or indehiscent. Seeds immersed in a pulp, apterous, often with an arillus. Testa thin and membranaceous, exalbuminous. Embryo straight.

The Clusiaceæ consist of trees or shrubs, some of which are parasitical. The leaves are exstipulate, opposite, very rarely alternate, coriaceous, entire, with a strong midrib and numerous lateral veins. The flowers are generally numerous, axillary, or terminal, and articulated with their peduncle. They all abound in a viscid, yellow, acrid, and purgative gum-resinous juice, and are natives of the tropics; the greatest number of South America and the East Indies. Several of them afford edible fruits, more especially some of the species of Garcinia.

Hebradendron.—*Graham.*

Flowers unisexual. Males: sepals 4, persistent, membranaceous. Petals 4. Stamens monadelphous. Filaments quadrangular. Anthers terminal, with an umbilicate, circumscissile operculum. Females unknown. Berry 4-celled, cells 1-seeded, crowned by a sessile, lobed, muricated stigma.

This genus was established by Dr. Graham (*Comp. to Bot. Mag.* ii. 199) for a tree growing in the island of Ceylon, which furnishes some of the Gamboge of commerce. The name is founded on the peculiar dehiscence of the anthers. The female flower not having been discovered, it cannot be classed according to the sexual system; but it is likely that it belongs to the same class as Garcinia.

H. cambogioides, *Graham.*—Male flowers in axillary fascicles. Sepals, when young, sub-equal. Leaves obovate-elliptical, abruptly sub-acuminate.

Graham, *Comp. Bot. Mag.* ii. 199; *Amer. Jour. Pharm.* xiii. 19; Lindley, *Flor. Med.* 113; *Cambogia gutta*, Linn. *Zeylan.* 87.

Description.—A moderate-sized tree, with opposite, petiolate, obovate-elliptical, abruptly acuminate, coriaceous, smooth shining leaves, which are dark green above, and paler beneath. The flowers are unisexual. The males clustered in the axils of the petioles, on short one-flowered peduncles. The sepals are four, imbricated, sub-equal, concave, membranaceous; the outer sub-entire, the inner denticulo-ciliate, yellow within, yellowish-white externally. The petals are also four, spathulate-elliptical, crenulate, coriaceous, longer than the calyx, deciduous, yellowish-white, with a red tinge on the inner base. The stamens are monadelphous. The filaments quadrangular, and bearing terminal anthers, which open by a circumscis-

Fig. 85.

H. cambogioides.

1. Calyx. 2. Stamens. 3. Anthers. 4. Top of anther. 5. Berry.

sion of a flat umbilicate lid. The female flower is unknown. The fruit is a berry about the size of a cherry, round, with a firm reddish-brown external coat, and having a sweet pulp, quadrilocular, surrounded at base by the persistent calyx, and a few abortive stamens, and crowned by a four-lobed, tuberculated, sessile stigma; each of the cells contains a single seed. This is large in proportion to the berry, uniform-elliptical, compressed on the sides, with a yellowish-brown testa. The cotyledons are thick, and cohere into a uniform cellular mass. The radicle is central, filiform, and slightly curved.

This tree is a native of Ceylon, where it is called *Kana Goraka*, and the fruit is eaten by the natives. It abounds in a yellow resinous juice, which, when hardened, is one of the varieties of Gamboge of commerce, that of Ceylon; and it is probable that the Siam article is furnished by a closely-allied species, as their chemical composition is all but identical.

Much difference of opinion has existed respecting the tree or trees from whence this gum-resin was derived, one author attributing it to a *Garcinia*, another to a species of *Stalagmitis*, &c. Dr. Graham has investigated the subject so fully that a synopsis of his remarks will place the matter in the clearest point of view. He observes that Linnæus, in his Flora Zeylanica, when noticing his *Cambogia*, quotes as a synonyme of it the *Carcapuli acostæ* of Plukenett's Almagestum Botanicum; this Dr. Graham thinks identical with f. 3 t. 147 of his Phytographia, which is *Xanthochymus ovalifolius*. Linnæus also quotes the "arbor Indica, quæ gummi guttam fundit," &c., of Commelin's Flora Malabarica, which is the *Coddam Pulli* of Rheede, the *Mangostana cambogia* of Gærtner, the *Garcinia cambogia* of Desrousseaux and De Candolle. He also cites "carpapuli acostæ, arbor indica," &c., of Burmann, which is *Mangostana morella* of Gærtner, *Garcinia morella* of Desrousseaux and De Candolle, and the *Stalagmitis cambogioides* of Moon.

To add to the confusion, Wight and Arnott state that the *Stalagmitis cambogioides* of Murray is a species of Garcinia, perhaps identical with the *G. cochinchinensis* of Choisy, the *Oxycarpus cochinchinensis* of Loureiro; and also that it is the same as the *Xanthochymus ovalifolius* of Roxburgh. The specimen from which Murray drew up his account of *Stalagmitis* having, at Dr. Graham's instance, been examined by Mr. Brown, he ascertained that it was made up of two plants, and probably of two genera, the flowering part belonging to *Xanthochymus*, and the other to the species under consideration, and which Mr. Brown says is very like the specimen in Hermann's herbarium, which was the type of the *Cambogia gutta* of Linnæus. Now by the laws of priority the name given by Roxburgh must cede to that of *Stalagmitis*, and as this genus was established on parts of two distinct genera, it must fall to the ground; and as the plant described by Dr. Graham differs in several important particulars from *Garcinia*, it must take the name he has bestowed upon it.

There is still another tree, a native of Malabar, which has been referred by Wight and others to *Garcinia*. It was first described by Roxburgh (*Fl. Ind.* ii. 627) as *G. pictoria*, but is considered by Drs. Graham and Lindley to belong to *Hebradendron*. It is thus described by Royle (*Mat. Med.* 304.)

H. PICTORIUM.—A tall tree, with a pretty thick bark, having considerable masses of gamboge on its inside. Leaves on short petioles, oblong, ventricose, rather acute, from 3 to 4 inches long, by 1½ to 2 broad. Flowers yellow, axillary, solitary. Calyx permanent, of two pairs of concave, obtuse sepals. Petals 4. Stamens from 10—15, with the filaments united into four masses, which all coalesce at base into a narrow ring. Anthers of the male flower peltate; of the female 2-lobed, and seemingly fertile. Germ superior, round, 4-celled, with a single ovule in each, attached to the axis a little above its middle. Stigma 4-lobed, permanent. Berry size of a large cherry, oval, smooth, very slightly marked with 4 lobes, crowned by the permanent stigma. Seeds 4, when all ripen, oblong reniform.

Dr. Roxburgh says that the colour of the gamboge from this tree is superior to the Chinese, but not so permanent. Mr. Dyer, from whom he procured it, states that it is as effective as a purgative, and equal in all respects to any other kind. Dr. Christison, who examined some gamboge from Wynaad, says that it has the composition of the Siam, but with less gum; is a good purgative, and not fugacious, as asserted by Roxburgh (Royle, *O. C.* 304).

Fig. 86.

H. pictorium.

1. Berry. 2. Calyx. 3. Cells of berry. 4, 5, 6. Seeds.

It is evident, however, that although the Hebradendron furnishes the Ceylon gamboge, that a similar product is afforded by a variety of trees of the natural order of Clusiaceæ, perhaps from the whole of them. Mrs. Walker, a resident of Ceylon, from whom Dr. Graham obtained his specimens, states that gamboge "is collected by cutting pieces of the bark completely off, about the size of the palm of the hand, early in the morning. The gamboge oozes out from the pores of the bark in a semi-liquid state, but soon thickens and is scraped off by the collectors next morning, without injury to the tree, the wounds in the bark readily healing and becoming fit to undergo the operation again." She also says that the juice of the *Garcinia cambogia*, one of the most common trees in her vicinity, affords a similar juice, but that it never hardens thoroughly, and is not collected by the natives.

Almost all the gamboge of commerce is from Siam, and not from Ceylon; but, as before stated, as they are identical in chemical composition, it is highly probable they are the product if not of the same species, at least of plants of the same genus. Pereira observes that it has been suggested, that the plant may have been carried from Siam to Ceylon, for the religion of Bhudda is supposed to have passed from the former to the latter, and with it the practice of painting the temples and holy dresses with gamboge. According to Murray, this gum-resin is obtained in a different manner in Siam from that described by Mrs. Walker as practised in Ceylon; he states that the small branches and leaves are broken or torn, and the resinous juice that exudes is received either in leaves or cocoa-nut shells, and thence poured into flat earthen vessels, where it is allowed to harden sufficiently to be made into rolls, which are then enveloped in leaves; or else poured into bamboo cylinders, whilst still liquid.

Gamboge is a gum-resin, of a yellow orange colour, which deepens on exposure to the air, opaque, brittle, having a conchoidal fracture, possessing very little smell, but a taste which, although insipid at first, becomes acrid; it tinges the saliva of a bright yellow colour. It is soluble in the alkalies, alcohol, and the essential oils, but only forms an emulsion with water. It is composed of about three parts of resin to one part of gum. The resin is con-

sidered as an acid by some writers, and is called the *Gambogic;* it is the active principle, the gum being inert.

Gamboge was first described by Clusius in 1605. It was brought from China by the Dutch, under the name of *Ghittaiemou*, and soon attained much celebrity as a hydragogue purgative. Several kinds are found in commerce; that from Siam being in cylinders or pipes, or in lumps and cakes, the first being most esteemed; that from Ceylon, which is unknown in our market, is stated by Dr. Christison to be in roundish flattish masses, as if moulded in shallow bowls. The only article that can be confounded with Gamboge is a gum-resin from New Holland, called yellow gum, the produce of the *Xanthorrhœa hastile;* but as the alkalies act in a very different manner on it than on Gamboge, any falsification could be readily detected.

Medical Properties, &c.—Gamboge is an active hydragogue and drastic purgative, less active than elaterium or croton oil, but more so than jalap, scammony, or colocynth. It is very apt to cause irritation of the stomach and produce nausea and vomiting. This has been explained on the ground of its ready solubility in the fluids of the stomach; but as aloes and some other purgative substances are equally soluble, and yet do not act on this viscus in so decided a manner, it is much more reasonable to attribute it to the great acridity of the substance. The best mode of obviating it is to give the medicine in the form of a pill, or to combine it with some article that will lessen its acrid properties.

Gamboge is a purgative well calculated for those cases where a powerful impression is wished to be made on the bowels, either to rouse them to activity when they are torpid, or to make them a centre of irritation, to relieve some other organ. From the hydragogue powers of this drug, it has also proved extremely beneficial, where it is of importance that large quantities of the fluids should be eliminated, as in dropsies. For this purpose Gamboge, in combination with jalap or cream of tartar, is very serviceable. If it be combined with an alkali it will also act on the kidneys. As an anthelmintic it has also been found useful, more, however, from its evacuating powers, than from any action it exercises on the worms themselves. From its extreme activity and irritating qualities, it is contra-indicated whenever there is inflammation of the stomach or bowels; in the pregnant state or in an excited condition of the uterus in females, and where there is irritation or disease of the urinary organs.

The dose is from one to four grains, in the form of pill, to be repeated until the desired effect is produced. An excellent mode of giving it, is in the form of the *Compound Cathartic Pill*, U. S. P.

Many other plants of this order are possessed of medical properties. The *Calophyllum inophyllum* affords an oil from its nuts, which is much prized in the Philippine Islands as an application in rheumatic affections; it is also used for burning. Dr. Horsfield states, that in Java the nuts and bark of the root are considered to possess diuretic properties. This plant and the *C. calaba* furnish the resin known as East Indian Tacamahaca, and Barham (*Hort. Amer.* 18) speaks of the balsam from the *C. brasiliense* as of great efficacy as a vulnerary.

In the genus *Mesua*, the bark and root are bitter and aromatic, and possess much sudorific power; the leaves are mucilaginous, and the unripe fruit aromatic, acrid, and purgative. From the wood an oil is obtained, somewhat resembling that of anise; it has been analyzed by M. Lassaigne (*Jour. de Pharm.*, ix. 468). An article derived from the West Indies and South Ame-

rica, under the name of Hog gum, is furnished by more than one plant of this order; Endlicher says it is the product of the *Clusia flava;* Dr. Macfadyen, that it is derived from the *Moronobea coccinea;* and Bancroft, that it is from a plant allied to *Garcinia.*

The *Mammea* affords a resinous juice, which is used in the West Indies to destroy the *Chigoe* (Culex penetrans); the fruit is much esteemed as demulcent and pectoral, but the seeds are astringent and poisonous. The flowers of several species of *Clusia* abound in a resinous juice, which is used as a vulnerary in some parts of the West Indies (Nicholson, *Hist. St. Doming.* 232). The *C. insignis* furnishes this product in great abundance; Martius states that he obtained an ounce from two flowers, in Brazil. This resin, rubbed down with butter of cacao, is employed in the sore breasts of nursing women.

Fig. 87.

G. mangostana.

As previously stated, many of the fruits are edible, and highly esteemed, especially those of some species of *Garcinia*, one of which, the Mangosteen, is generally acknowledged to be the most delicious of all fruits. The large berries of the *Platonia insignis*, of Brazil, are sweet and pleasant, and the seeds have the taste of almonds.

Order 21.—HYPERICACEÆ.—*Lindley.*

Sepals 4–5, distinct or united at base, persistent. Petals as many as and alternate with the sepals, hypogynous as well as the stamens, which are numerous, and more or less united at base into several parcels. Anthers attached by the middle, introrse. Ovary of 2–5 carpels. Styles slender, persistent. Pericarp baccate or capsular, 2–5-valved. Seeds numerous, small, anatropous, with no albumen.

This order consists of trees, shrubs, or herbs, having a resinous juice, and variously and largely furnished with glands. The leaves are opposite, entire, not provided with stipules, and closely dotted with small, depressed, resinous glands. The flowers are in most cases yellow, and very often the sepals and petals are marked by dark-coloured glandular dots or lines. The species are very numerous, and are widely dispersed over the world; they are all possessed of aromatic and resinous qualities, and some of them are actively purgative.

Hypericum.—*Linn.*

Sepals 5, somewhat equal, foliaceous. Petals 5, oblique. Stamens numerous, scarcely united at base. Styles 3–5, distinct or united, persistent. Pericarp membranaceous, roundish, cells equal in number to the styles.

This extensive genus contains herbaceous or shrubby species, found in all parts of the world, and of which between thirty to forty are natives of North America. They all possess medicinal properties in a greater or less degree, proportionate to the abundance or otherwise of the oil-bearing glands of the flowers and leaves. Certain species, having a berry instead of a capsular fruit, have been separated under the generic name of *Vismia.* These are principally natives of tropical climates, and furnish a yellow product, very analogous to gamboge.

H. PERFORATUM, *Linn.*—Stem ancipital, erect, branched; leaves ovate-elliptical, obtuse, with pellucid dots; petals longer than the acute-lanceolate sepals.

Linn., *Sp. Pl.* 1105; Willdenow, *Sp.*, iii. 1453; Pursh, *Fl.*, ii. 377; Torrey and Gray, *Fl.*, i. 160; *Eng. Bot.*, t. 295; Lindley, *Fl. Med.* 117.

Common Name.—St. John's Wort.

Foreign Names.—Millepertuis, *Fr.;* Caccia diavoli, Iperico, *It.;* St. Johannes Kraut, *Ger.*

Description.—Roots perennial, fusiform, tortuous. Stem ancipital, about eighteen inches in height, much branched, curved below, but erect above. The leaves are closely sessile, of an ovate-elliptical shape, of a light green colour, and conspicuously marked with numerous pellucid dots. The flowers are of a bright yellow colour, arranged in a terminal corymb. The calyx is persistent, and is composed of five acute-lanceolate sepals, united at base. The corolla is of 5 ovate, obtuse, sessile petals, much longer than the sepals, of a yellow colour, with numerous dark glandular spots at the edges. The stamens are numerous and divided into three sets. The anthers are small. The styles are 3, with very small stigmas. The fruit is a somewhat globose capsule, with three cells, and opening naturally by three valves. Seeds numerous, very small.

This common plant is a native of Europe, but has been introduced into the United States, and, unfortunately for the farmer, has become very abundant, as it is very difficult to eradicate, and is extremely exhausting to the ground. It is also said to exercise an injurious effect on cattle, by inflaming the skin wherever the hair is white. Although this belief is very general, it is by no means proved that the injury is owing to the St. John's Wort, and we are much inclined to believe that it is attributable to a species of Euphorbia, which is in almost all cases found growing where the Hypericum abounds, the acrid juice of the former plant being fully capable of causing inflammation, whilst the oil furnished by the glands of the latter, and which is the active principle of the plant, is celebrated for its vulnerary powers.

The St. John's Wort was held in high estimation by the earlier writers on the Materia Medica, and numerous virtues attributed to it, particularly as a febrifuge and anthelmintic; and it still enjoys much reputation in some parts of Europe, in the treatment of many diseases, but is seldom or never employed by the regular practitioner. In this country, it is only used to make an oil or ointment, which is said to be an excellent application in ulcers, the reduction of tumours, &c.; and, from some trials with it, we are disposed to think favourably of it. It is made by infusing the flowers in oil or lard until these substances are tinged of a red colour. The first of these preparations, although perfectly fluid at first, has a tendency to solidify, when kept for any length of time. Whatever may be the real value of this plant as a medicinal agent, it deserves attention, and that a fair trial should be made of it; the testimonies in its favour are so strong, that it can scarcely be as inert as is now supposed; and, as is observed by Cullen (*Mat. Med.* 173), "we should not be so audacious as to neglect it, for by the sensible qualities it appears active;" and further adds, "that there are many well-vouched testimonies of its virtues, particularly of its diuretic powers."

No complete analysis has been made of this plant; but from the experiments of Mr. Blair (*Am. Jour. Pharm.*, ii. 23), its active constituents appear to be an acrid, resinous substance, pervading the whole plant, a red oil, furnished by the glands on the petals, and some tannin. Hypericum is not recognised as officinal by the United States Pharmacopœia, but is so by many of the European authorities, as a constituent of a variety of syrups, tinctures, &c.

There are many other species, which have obtained some celebrity; thus the *H. lanceolatum*, a native of the Isle of France, is there used as a specific

in syphilis, and the *H. connatum* is employed in Brazil as an astringent in sore throat, as is also the *H. laxiusculum* against the bites of venomous snakes; and finally, several species are considered in Russia as efficacious in hydrophobia.

Group IX.—Silenales.

Order 22.—CARYOPHYLLACEÆ.

Sepals 4–5, continuous with the peduncle, persistent, distinct, or cohering in a tube. Petals 4–5, hypogynous, unguiculate, inserted on the peduncle of the ovary, sometimes split into 2 parts or even wanting. Stamens generally twice as many as the petals, or equal in number to the sepals and opposite to them, inserted on the peduncle of the ovary; filaments subulate, sometimes monadelphous; anthers innate, 2-celled, with a longitudinal dehiscence. Ovary stipulate, on the apex of a pedicel (*gynophore*) composed of 2–5 carpels, with adherent and valvate edges, or so turned inwards as sometimes to touch the central placenta; stigmas 2–5, sessile, filiform; ovules few or indefinite. Capsule 2–5 valved, either 1 or 2–5-celled. Placenta central. Seeds usually indefinite; albumen mealy; embryo external, curved round the albumen, or sometimes straight.

These plants are usually small herbs, occasionally suffruticose, with opposite and entire leaves often connate at base, without stipules. They are principally natives of cold and temperate climates; those occurring in tropical regions usually growing at high elevations.

Their general character is that of insipidity. Some, however, are endowed with more active qualities; thus many of them have saponaceous properties depending on the presence of a peculiar principle called *Saponine*, and allied to the active constituent of Sarsaparilla. This exists in the roots of *Saponaria officinalis*, *Gypsophila struthium*, &c.; it is bitterish, spumescent with water, and used instead of soap, in Europe, for cleansing clothes. The plants in which it is found, have obtained some notice as substitutes for sarsaparilla in the treatment of syphilis, chronic cutaneous affections, jaundice, &c. Several of the American species of *Silene* have been employed with some success as anthelmintics, especially the *S. virginica*, (Barton, *Collec.* i. 39.) The flowers of the Pink, (*Dianthus*,) were at one time esteemed to be tonic, astringent and sudorific, but are at present only used to colour certain preparations. Lemery, (*Dict.* 264,) says that the petals of the *D. plumarius* are cephalic, and have been found efficacious in epilepsy. The seeds of *Agrostemma githago*, or Corncockle, are reported to render meal unwholesome when ground with the grain; from the experiments of Cordier, it would appear that this is erroneous, for although somewhat acrid, they are not poisonous. On the other hand, many of the older writers speak of them as active, and recommend them highly in some cutaneous disorders, and also in hæmorrhages, and as an external application to ulcers and fistulas.

Group X.—Malvales.

Order 23.—STERCULIACEÆ.—*Ventenat.*

Calyx naked, or surrounded with an involucre of 5 sepals, more or less connected at base, with a valvate æstivation. Petals 5, (or more,) hypogynous, convolute in æstivation. Stamens indefinite, variously monadelphous; anthers 2-celled, extrorse. Pistil consisting of 5, (rarely 3,) carpels, either distinct or cohering. Styles equal in number to carpels, distinct or united; ovules erect, if definite, sometimes indefinite. Fruit capsular, with 3–5 cells, or drupaceous, or berried, or even composed of distinct follicles. Seeds

ovate or angular, winged or woolly; albumen rarely wanting, oily or fleshy. Embryo straight or curved.

These plants are large trees or shrubs, with alternate simple or compound, or even digitate leaves, with free deciduous stipules. The inflorescence is various. Nearly all the species are tropical, or at least natives of warm climates; some of them are of prodigious size; the *Adansonia* having been found with a trunk of 30 feet in diameter, and some species of *Bombax* and *Ceiba* are of almost as gigantic dimensions.

They are chiefly remarkable for the abundance of mucilage they contain, but some of them have more efficient properties. The leaves of the *Adansonia* are reduced to powder in Africa, in which state it is called *Lalo*, and mixed with their food by the negroes, they being of opinion that it tends to diminish perspiration; it has also been found useful in bowel complaints. The juice of the fruit is used as a drink in fevers, (*Bot. Mag.* 2792.) The dried pulp mixed with water is considered efficacious in dysentery, and from the experiments of Dr. L. Frank, it would seem that its virtues have not been overrated, (*Delile. Cent.* 12.) The fruit forms an object of commerce in Africa, and is transported to great distances. When burnt, the ashes are mixed with palm oil to form a soap.

The powder of the capsules of the *Helicteres isora* is used in India, made into an ointment with castor oil, in ulcerations of the ears, (*Ainslie*, ii. 447,) and Rheede states that a decoction of the fruits and leaves is useful in fevers, catarrh, &c. (*Hort. Malab.* vi. 55.) Sloane and Lunan speak of the efficacy of the juice of the root of a Jamaica species in stomach affections, and St. Hilaire found the *H. sacarolha* used in Brazil in venereal complaints, (*Pl. usuelles. Bras.* lib. 13,) and Martius says that the *Myrodia angustifolia* is employed for the same purpose. Many species of *Sterculia* are likewise resorted to for remedial purposes. The *S. tragacantha* furnishes the Sierra Leone tragacanth, and the *S. urens*, of India, affords a similar product. The pod of *S. fœtida* is employed in Java against gonorrhœa, whilst the leaves are considered aperient and revulsive, (*Horsefield;*) the bark of *S. balanghas* has some reputation in the Moluccas as an emmenagogue. The seeds of several of the African species are employed in Africa to render brackish and semi-putrid water palatable, and are spoken of by travellers under the name of *Kola* nuts.

Fig. 88.

C. platanoides.

One of the most curious plants of this order is the *Cheirostemon platanoides*, or Hand-tree of Mexico; the flower of this has no petals, but a large angular calyx, somewhat resembling a leather cup, from the centre of which rises up a column, bearing five narrow curved anthers, with a curved style in the centre, looking like a hand with claws. It was known to the Mexicans by the unpronounceable name of *Macpalxcochiquauthitl*. Only one tree was known, near Toluca, which they consider as holy.

Order 24.—BYTTNERIACEÆ.—*R. Brown.*

Calyx herbaceous, membranous or coriaceous, 4–5 lobed, valvate in æstivation. Corolla none, or of as many petals as there are lobes in the calyx, either flat, but twisted in æstivation, or arched and ligulate; folded inwards towards the edges and valvate in æstivation, permanent or deciduous. Stamens hypogynous, definite, opposite the petals, or twice as many, half only fertile and opposite the petals, or indefinite, as many being barren as there are sepals and opposite to them, usually united in a tube. Anthers introrse, 3-celled, with a longitudinal dehiscence, rarely by a cleft or pore near the apex. Ovary free, sessile, or on a short pedicel, composed of 4–10 carpels, around a central column, or

one only. Styles terminal, consolidated. Stigmas equal in number to the cells. Fruit usually a capsule splitting through the cells, or dividing at the partitions. Seeds sometimes winged, but generally round. Embryo usually in a small quantity of fleshy or mucilaginous albumen, straight or curved. Cotyledons fleshy, or usually foliaceous, entire or split, plaited or folded, or even rarely spiral.

Trees, shrubs, or undershrubs, sometimes climbing, generally furnished with a stellate or forked pubescence or scurfy. Leaves simple, alternate, usually notched at the edges, generally with deciduous stipules. Inflorescence various. They are natives of tropical or temperate climates. Many of them are possessed of medicinal powers, and one is valuable as furnishing the cacao.

The *Waltheria douradinha* is employed in Brazil as a vulnerary, and its decoction is reputed efficacious in syphilis, catarrhal complaints, &c. (St. Hilaire, *Pl. usuell. Bras.*, liv. viii.) Another species, the *W. fruticosa*, is said by Rottboll to be febrifuge and anti-venereal (Sprengel, *Hist. Med.*, vi. 467). The bark of *Gauzuma ulmifolia* is administered, in infusion, as a sudorific, and is esteemed beneficial in cutaneous affections in Martinique (*Flor. des Antill.*, ii. 73); the fruit abounds in a pleasant mucilage, and the young bark is used to clarify sugar. The bark of *Kydia calycina* is employed in India as a remedy in eruptive diseases. The fibrous tissue of the bark is so strong in some of the plants of this order as to be manufactured into cordage.

The most important species of the order are those composing the genus *Theobroma*, the seeds of which, called Cacao, are the basis of chocolate.

Fig. 89.

T. cacao.

These are afforded by several species, and are not the product of one only (the *T. cacao*), as has been asserted. They are all small trees, occurring in the West Indies and South America. The seeds are contained in an ovoid capsule, deeply furrowed on the sides, of different colours in the various species and varieties, usually, however, of some shade of yellow, when fresh, and brown when dried. Each of these pods contains from twenty to thirty nuts, of an almond shape, and consisting of a white and sweet, somewhat oleaginous substance, covered by a leathery-like shell. When the fruit is perfectly ripe, it is broken to extract the seeds; these are now pulpy, of a sweetish acid taste; they are then dried and packed for exportation. Whilst the fruit is fresh, an ardent spirit can be distilled from it. There are a variety of kinds of Cacao; the best is that of Caraccas. Before being formed into chocolate, the nuts are roasted, and their external covering removed; the kernel is triturated until it forms a paste, when it is put into moulds, where it soon hardens into what is called chocolate. When in a state of paste it is variously flavoured with sugar, vanilla, spices, and other ingredients, according to taste. The use of chocolate is universal; it is nourishing, but does not agree with the stomachs of many persons. Where it is digested without difficulty, it is very restorative and analeptic. Those who cannot use chocolate can often take an infusion of the husks, with much benefit. The nut contains a fatty, solid oil, generally known under the name of butter of cacao. This is of a pleasant smell, of a whitish-yellow colour; it is very emollient, and has been used for suppositories, as an ingredient in cough mixtures, &c., but its principal consumption is by the perfumer, in the formation of soaps and pomatums.

Cacao contains a neutral crystalline principle, called *Theobromine*, analogous in composition to *Theine* and *Caffeine*, being, like them, highly azotized. It may be noticed as remarkable, that the plants containing these

principles are instinctively used by almost all nations, and especially by those who feed principally on vegetable products.

Order 25.—MALVACEÆ.—*Jussieu.*

Sepals 5 (seldom 3–4), united at base, often with an exterior calyx or involucrum; æstivation valvate. Petals as many as sepals, hypogynous, æstivation valvate. Stamens hypogynous, as many or commonly a multiple of the petals, monadelphous. Anthers reniform, 1-celled, dehiscing transversely. Ovary of many carpels, round a common axis, distinct or coherent. Styles as many as carpels, united or distinct. Stigmas as many or twice as many as styles. Fruit capsular, rarely baccate. Carpels 1 or many-seeded, sometimes united or distinct, the dehiscence septicidal or loculicidal. Seeds ex-albuminous. Embryo curved. Cotyledons foliaceous, twisted.

The large order of Malvaceæ is composed of trees, shrubs, and herbs, with alternate, stipulate leaves, which are in general palmately veined and clothed with a stellate pubescence. They occur in many parts of the world, the shrubby and arboreous species being mostly confined to warm regions. Their general character is that of abounding in mucilage, and being destitute of any unwholesome qualities, or of marked medicinal powers, though several of them have been recognised as officinal among the class of demulcents.

Althæa.—*Linn.*

Calyx surrounded with a 6–9 cleft involucel or outer calyx. Capsules numerous, indehiscent, 1-seeded, arranged in a ring round the axis.

A. officinalis, *Linn.*—Leaves with a soft tomentum on both sides, cordate or ovate, toothed, entire or 3-lobed. Peduncles many-flowered, shorter than the leaves.

Linn., *Sp. Pl.* 966; Woodville, i. 53; Stokes, *Med. Bot.*, iii. 530; Stephenson & Churchill, i. 51; Torrey & Gray, *Fl.*, i. 229; Lindley, *Flor. Med.*, 143.

Common Name.—Marsh-mallow.

Foreign Names.—Guimauve, *Fr.*; Altea, *It.*; Eibisch, *Ger.*

Description.—The root is spindle-shaped and somewhat woody. The stems are annual, round, leafy, erect, somewhat branching towards the top, and downy. The leaves are of a hoary green colour, tomentose on both sides, alternate, ovate or cordate, plaited, more or less divided into lobes, and are supported on long petioles. The flowers are of a uniform purplish-rose colour, and grow in short, dense, axillary clusters. The calyx is double, the outer one 6–9 cleft, whilst the inner one is divided into five segments. The petals are five, ob-cordate, unguiculate. The stamens are numerous, separate above, and bear reniform anthers. The ovary is orbicular, surmounted by a cylindrical style, divided into many subulate stigmas. The capsules, which are often twenty in number, are compressed and ranged in a circle, round a columnar axis; each has two valves, and contains a single, reniform, smooth, brown seed.

Fig. 90.

A. officinalis.
1. Styles. 2. Stamens. 3. Outer calyx. 4. Inner calyx.

This plant is indigenous to many parts of Europe, and has been naturalized in some places in this country. It is generally found in wet situations, especially near the sea. In Europe it is also cul-

tivated on account of its roots, which are much employed here for medicinal purposes. These, as found in the shops, are in pieces of three or four inches in length, about the thickness of the finger, of a white colour externally, owing to the removal of the grayish-yellow epidermis. They possess scarcely any odour, and have a vapid, mucilaginous taste. They have often been analyzed, with nearly similar results, namely, a large proportion of mucilage, fecula, inuline, &c. Mr. Bacon discovered what he thought to be a new principle in them, on which he bestowed the name of *Altheine*, but subsequent researches have shown that it is identical with *asparagine*.

Medical Properties, &c.—The Marsh-mallow is very generally used in Europe as a demulcent and emollient, but in this country its employment is very limited, its place being supplied by other articles of equal efficacy, which are more readily procurable, and especially by the bark of the Slippery Elm. It would be superfluous to advert to the various preparations of this article and their applications; it is sufficient to state, that externally, it is employed in fomentations, baths, and cataplasms, and internally, in infusion, syrup, and in a conserve that enjoys a high reputation as a demulcent in irritations and inflammations of the respiratory organs. The powder is also used to give consistence to many pharmaceutical preparations. As almost all the Malvaceæ possess the same mucilaginous properties, several of them are advantageously substituted for the Marsh-mallow, some of them, in fact, present much higher claims to notice, particularly the *Abelmoschus esculentus*, or Okra, which abounds in a bland mucilage that might be advantageously employed as an emollient in many of the phlegmasiæ.

The flowers of the *A. rosea*, are used in Greece for the same purposes as those of the Marsh-mallow, and the leaves are said to yield a blue colouring matter analogous to indigo.

Gossypium.—*Linn.*

Calyx cup-shaped, obtusely 5-toothed, with a three-leavel involucel, with the leaves united and cordate at base, and irregularly dentate and incised; stigmas 3–5. Capsules 3–5-celled, loculicidal. Seeds numerous, embedded in cotton.

This highly interesting and important genus consists of several species, but the best botanical authorities differ as to the exact number. De Candolle admits of thirteen, and many more are enumerated by other writers. Dr. Hamilton, who is followed by Wight and Arnott, is of opinion that there are but two, the *G. album*, with white seeds, and the *G. nigrum*, with black seeds. Cultivation has produced so many changes that it is now difficult to decide as to the propriety of thus limiting or extending the species. In all of them the young branches and leaves are more or less marked with black dots, and the nervures of the lower surface of the leaves furnished with one or more glands. They are natives of the tropical regions of Asia and America.

G. herbaceum, *Linn.*—Leaves 3–5 lobed, with a single gland below, lobes mucronate. Seeds free, covered with a short tomentum under the long white cotton.

Linn., *Sp. Pl.* 845; De Candolle, *Prod.* i. 456; Roxburgh, *Fl. Ind.* iii. 184; Torrey and Gray, *Fl.* i. 230.

Common Name.—Cotton Plant.

Foreign Names.—Cotonnier, *Fr.;* Bambagia, Cotone, *It.;* Krautargige baumevolle, *Ger.*

Description.—A shrub which is about three or four feet high, with a round, upright pubescent stem, brown at the lower part, with straight fissures, spotted with black at the top, the branches are spreading. The leaves are five-lobed, with a single gland below. The calyx is cup-shaped, obtusely five-toothed, and surrounded by a three-leaved involucel, the leaflets of which are much cut and dentate. The corolla is composed of five spreading petals united below into a tube, of a pale yellow colour, with a red spot on each

at base, deciduous. The capsule is bluntly three-cornered, three-valved, three-celled; containing about three seeds in each cell, immersed in cotton; these seeds are clothed with a close, dense, short tomentum, are convex on one side, and somewhat flattened on the other.

The varieties are exceedingly numerous, both as regards the glands, the colour of the flowers and the shape of the leaves, as well as the length and fineness of the cotton, and the height to which the bush grows. Dr. Macfadyen, (*Flor. Jam.* i. 74,) says: "I am inclined to the opinion that the numerous sorts of cotton we meet with, are properly but varieties of one species, and hence the characters by which it has been attempted to distinguish them, are so variable and so little to be depended upon."

Cotton appears to be indigenous to all the tropical regions of the old and new world. It was early known and used in India and Egypt; in the former of these countries, apparently antecedent to its employment in the latter, where it was long preceded by the use of flax, as is shown by the mummy-bandages of the earliest date being universally composed of linen. Both Herodotus and Arrian speak of cotton as indigenous to India, whence it probably was carried to Egypt. It was found in general use in Mexico and South America at the time of the conquest, and the cloth made from it, found in Peruvian tombs, demonstrates that it was a production of the country, and not derived from Eastern sources. It may also be stated that the wild species differ in the two hemispheres.

The cotton plant, as before stated, is a native of warm climates, but is often found at considerable elevations, as Humboldt saw it growing in Central America, at an elevation of 9000 feet, and in Mexico as high as 5500, and Royle states that in the Himalayas it occurs at 4000 feet above the level of the sea. The finest qualities are grown near the sea, as in the case of the Sea Island cotton, from the coast of Georgia. In a work like the present, it would be out of place to speak of the commercial importance of this article, but its medical properties require notice, though they are not of a very decided character. The flowers are used for the same purposes as those of the mallow, as are also the roots, which Ainslie, (*Mat. Ind.* ii. 283,) states have been useful in India, in complaints of the urinary organs. In Brazil a decoction of the leaves is thought beneficial in the bites of venomous reptiles; and steeped in vinegar, they are said to relieve hemicrania. According to Martius, the seeds, which afford much oil, are emollient, and are employed in emulsions, and injections in diseases of the mucous membranes.

The cotton-wool, when carded, forms an excellent application to burns and scalds, and has been recommended as a dressing to blisters, when it is wished to dry them rapidly. It has also proved useful in erysipelas.

Besides the above, many other plants of this order have acquired some repute for their demulcent and emollient qualities, among which may be noticed *Abutilon cordatum*, a common native species, the leaves of which are very mucilaginous, and are employed in some parts of the Southern States as a substitute for the Marsh-mallow; the fibres of the bark were used by the Indians in place of hemp. *A. indicum*, and other allied species, are esteemed in India as emollients, as is *Sphæralcia cisplatena* in Brazil. The most important plant of the order, after the cotton, is the *Abelmoschus esculentus*, so well known under the name of Okra, and so extensively used as a culinary vegetable. This plant abounds in mucilage, and may be employed medicinally in all cases requiring the employment of emollients and demulcents. The *A. moschatus* yields seeds having a strong odour of musk, and which are considered as cordial and stomachic. Dr. Hamilton, (*Trans. Med. Bot. Soc.* 1834,) gives an instance where these seeds were successfully administered in the bite of a venomous reptile.

Group XI.—Aurantiacales.

Order 26.—AURANTIACEÆ.—*Correa.*

Calyx urceolate or campanulate, 3–5 toothed, marcescent. Petals 3–5, broad at base, slightly imbricated in æstivation, inserted on the outside of a hypogynous disk. Stamens equal in number to or some multiple of the petals, inserted on a hypogynous disk; filaments flattened below, sometimes distinct, sometimes combined; anthers terminal innate. Ovary many-celled; style 1, cylindrical; stigma slightly divided, somewhat lobed. Fruit pulpy, many-celled, with a leathery indehiscent rind, abounding with vesicles of volatile oil. Seeds solitary or many, attached to the inner angle of each cell, usually pendulous; raphe and chalaza usually very distinctly marked, exalbuminous. Embryo straight; cotyledons thick and fleshy.

Fig. 91.

C. Limonum
From a wild specimen from the Himalayan mountains.
1. Stamens. 2. Bundle of Filaments and Petals, &c. 3. Cotyledon and Radicle. 4. Disk.

This well-marked order is composed of trees and shrubs, with alternate, often compound leaves, always articulated to the petiole, which is frequently winged; they are smooth and are filled with pellucid glands containing a volatile oil. They are almost exclusively natives of the East Indies, but have been spread over most tropical countries by cultivation. The Prince of Neuwied, however, speaks of a wild orange in Brazil, and Bartram makes frequent allusions to groves of oranges in Florida, supposed to be indigenous. (*Travels*, 244, 253, &c.) A few species have also been found in Madagascar. They all occur within the tropics, with the exception of a species of *Limonia*, which is found on the tops of lofty mountains, where it is for months enveloped in snow. (*Royle.*)

All the species have a hard and compact wood, and a more or less acid fruit. Besides the orange, lemon, &c., many other plants of this order are deserving of notice. The *Ægle marmelos*, of India, is much prized in India. From the rind the Dutch in Ceylon prepare a perfume. A decoction of the bark of the root is considered on the Malabar coast as very efficacious in hypochondriasis and palpitation of the heart; a decoction of the leaves is employed in asthma, and the unripe fruit in diarrhœa, whilst the mucus surrounding the seeds is a good cement. (*Ainslie*, ii. 188.) The fruit of the *Cookia punctata*, the Wampee of China, is much esteemed, and the berries of the *Glycosmis citrifolia* are said to be delicious. The leaves of *Feronia elephantum* are considered in India as stomachic and carminative, and are given in the bowel complaints of children; when bruised they have a very fragrant smell, resembling anise. A variety of this plant furnishes a gum very analogous to gum Arabic, and used as a substitute for it. (*Ainslie*, ii. 82.) The author just cited also states that the leaves of the *Bergera Kœnigii* are stomachic and tonic, an infusion of them toasted, allays vomiting, whilst the bark and root are used as stimulants. (*Ibid.* 139.)

CITRUS.—*Linn.*

Calyx 3–5-cleft, urceolate. Petals 3–8 oblong. Stamens 20–60; filaments dilated at base, polyadelphous; anthers oblong. Style 1, terete. Fruit baccate, 7–12-celled.

The species of this genus are very difficult to define, as from long cultivation they present innumerable varieties, both in the leaves and fruit. They are all trees or large shrubs with axillary spines. The leaves are all simple, but as they are articulated with the petiole, it is evident that they are in reality pinnate leaves reduced to the terminal leaflet. The fullest account of this genus has been given by Risso, in an elaborate work on those cultivated in the south of Europe.

1. C. AURANTIUM, *Risso.*—Leaves oval, elongated, acuminate; petiole, more or less dilated and winged. Flowers white, large. Fruit globose, depressed; skin rough; pulp sweet.

Risso, *Ann. Mus.* xx. 181; De Candolle, *Prod.* i. 539; Lindley, *Flor. Med.* 163.

Common Names.—Orange; Sweet Orange.

Foreign Names.—Oranger, *Fr.;* Arancio dolce, *It.;* Pomeranzin, *Ger.*

Description.—A middle-sized evergreen tree, much branched, and covered with a greenish-brown bark. Branches generally with axillary spines. Leaves alternate, entire, of a shining green colour, nearly elliptical, acuminated and furnished with winged footstalks. The flowers are large, white, and very fragrant, and arise from the smaller branches on simple and divided peduncles. The calyx is saucer-shaped, and divided into five pointed sepals. The petals are five, oblong, concave, and beset with small glands. The stamens are twenty or more, united at their base into several sets, and support vertical, yellow anthers. The ovary is superior, roundish, bearing a cylindrical style with a globose stigma. The fruit is globose, depressed, of a reddish-yellow colour externally, and internally divided into several cells, filled with a mucilaginous pulp; each cell containing from two to four white seeds, with a cartilaginous skin. The rind is composed of two distinct layers, the outer, thin and glandular; the inner, thick, white and spongy.

Fig. 92.

C. Aurantium.

1. Flower. 2. A set of Stamens. 3. Section of Ovary. 4. Section of Fruit.

The varieties of the orange are almost endless. Some are seedless, some are filled with a blood-red pulp, and some monstrous and distorted. The bitter orange has usually been considered as one of these varieties, but is now ranked by many writers as a distinct species, though except in the character of the fruit, the differences are very slight. The orange is originally a native of the warmer parts of Asia, but has long been naturalized in the South of Europe, and more recently in the tropical parts of America. It has been also supposed to be a native of the Canary Islands or Hesperides, and its fruit to have been that fabled to have been guarded by a dragon. Under this idea Ventenat called the order *Hesperidæ*, and it was also the origin of the name bestowed on the fruit by some botanists, *Hesperidium*. It was introduced into Europe from India, and Salessio, who has investigated the subject with much care, states that it was brought there by the Arabs, who introduced the sweet kind, through Persia, to Syria, and thence to Italy, whilst the bitter species were carried by Arabia, Egypt, and the north of Africa, to Spain. At the time of the Crusades, the orange was found to be abundant in Judea, and was supposed to be a native of the country. But there is no direct evidence to show that the ancients, either in Europe or Syria, were acquainted with this fruit, whilst there is much to prove that the introduction of it into those countries, was due to the Arabs. Loudon says, "It is remarkable that there are no authentic records existing of any species of Citrus having been known, certainly of none being cultivated, by the Romans. It is now generally admitted that the *mala aurea* of the Latin poets, is the quince, and not the orange, and the lines in the second book of the Georgics, usually quoted as evincing Virgil's knowledge of this fruit, evidently refer to the citron or lemon. As far as can be ascertained, the orange was not introduced into Italy until the fourteenth century, and thence gradually spread to other parts of Europe, and was carried over to America soon after its discovery."

The oranges used in this country are partly the growth of the more southern portions of it, as Georgia, Florida, and Louisiana, but the larger part come from the West India Islands, the Mediterranean, and the Azores. In every part of the United States they are liable to be injured by frosts, and hence cannot be considered as a certain crop; where this is not the case, the orange is a most prolific plant, and the quantity borne by a single tree is sometimes enormous; thus it is said that 20,000 have been gathered from one in St. Michael's, exclusive of those unfit for use which may be calculated at 10,000 more.

The orange contains a large quantity of saccharine matter and mucilage united to an agreeable acid, and hence is wholesome, cooling, and refreshing to the sick, especially in febrile and inflammatory complaints, but should always be used cautiously, as it is apt to disorder the stomach and bowels. In India, according to Ainslie, the Hindoo physicians esteem oranges very highly as a medicine, asserting that they purify the blood, allay thirst, cure catarrh, and improve the appetite. The juice of this fruit contains citric and malic acids, the super-citrate of lime, mucilage, sugar and water.

The rind or peel of the sweet orange is also used as a substitute for that of the bitter species, which is the true officinal article; it yields, by distillation, a fragrant essential oil. The immature fruit is also employed for the purpose of making issue peas; for this purpose they are turned smooth by a lathe: they have an aromatic odour and a bitter taste, and are also employed to flavour certain cordials. According to Lebreton, they are composed of volatile oil, sulphur, fatty matter, a peculiar principle called hesperidin, bitter astringent matter, some traces of acids, vegetable and mineral salts, &c.

The leaves have been employed by some practitioners as a remedy in many

nervous disorders, and are said to have proved beneficial in epilepsy and chorea. They are aromatic, and feebly bitter; and contain a fragrant volatile oil, which is procured on distillation, principally employed by perfumers. The flowers are much more celebrated as remedial agents, in substance, but more especially in their distilled water. Orange flower water, as it is termed, has a very agreeable odour, but less powerful than that of the flowers themselves, and is in general use in Europe as an antispasmodic, and is considered to possess much power; its use in this country is limited, but is becoming more extended; although not endowed with the active qualities ascribed to it, it forms a very pleasant drink to the sick, and exercises a soothing influence when the nervous system is unduly excited. An essential oil is also obtained from the flowers, known as oil of Neroli, much used as a perfume, and in the manufacture of Cologne and other scented waters for the toilet.

2. C. VULGARIS, *Risso.*—Leaves elliptical, acuminate, slightly dentate. Petioles more or less winged. Flowers large. Fruit orange-coloured, roundish, somewhat elongate or depressed. Pulp acid and bitter.

Risso, *Ann. Mus.* xx. 190; De Candolle, *Prod.* i. 539; *C. aurantium*, *Bot. Reg.* 346; Stephenson and Churchill, i. 14; *C. bigaradia*, Duhamel, *Arv.* vii. 99; Lindley, *Flor. Med.* 163.

Common Names.—Bitter Orange, Seville Orange.

Foreign Names.—Bigarade, Oranger sauvage, *Fr.*; Arancia forte, *It.*

Description.—This species closely resembles the sweet orange, and is only distinguished by the form of the fruit and bitterness of the pulp; the fruit is much more irregular in its shape, and has a much more rugose rind than the other. There are a great number of varieties, among which the most striking is a dwarf known under the name of Malta orange.

This species is cultivated in Europe and America, but from the bitterness of the fruit it is not eaten. The leaves, flowers, &c., are used for the same purposes as those of the sweet kind, but the volatile oils are said to be of a finer quality. The rind is the officinal *Cortex Aurantii* of the Pharmacopœias, though that of the *C. aurantium* is generally substituted for it in our shops.

3. C. MEDICA, *Risso.*—Petioles naked. Leaves oblong, acute. Stamens 40. Styles often wanting. Fruit oblong, rugose, with a thick rind and acid pulp.

Common Name.—Citron.

Foreign Names.—Citronnier, *Fr.*; Cedro magno, *It.*

Description.—A medium-sized tree, branches reddish or violet colour when young. The leaves are oblong, acute and subserrate, borne on naked petioles. The flowers are large and have from five to eight petals, which are purplish externally; the stamens are forty, polyadelphous; the styles are frequently abortive or wanting. The fruit is large, somewhat of a violet tint when young, and of a rich yellow when mature, the rind is adherent to the pulp, and of an agreeable odour.

This species has generally been confounded with the lemon, but is distinct from it in many respects, though it certainly approaches it very closely; the chief differences are the naked petiole, the greater number of stamens and the great thickness of the rind of the fruit. Like the other species, it was originally a native of Asia, but is now cultivated in all warm climates. The citron was known to the Hebrews, and is generally supposed to be meant in texts where, in our translation, the word apple is used (*Cant.*, ii. 7; *Joel*, i.), and Risso states that they are still used by the Jews at the feast of the tabernacles. Pliny speaks of it in his 13th book, chapter 3, thus quaintly translated by Holland: "I will begin with that, which of all others, is the most wholesome, the citron tree, called also the Assyrian tree, and by some the

Median apple, the fruit is a counter poison, and a singular antidote against all venom; the leaves are like those of the arbutus, and the tree is armed with thorns. The pome citron is not good to be eaten as a fruit, but is very odoriferous, as are the leaves, which are used to be put in wardrobes among apparel to give perfume, and to drive away moths and spiders." Virgil also alludes to it in those lines generally supposed to describe the orange or the true lemon, neither of which appear to have been introduced into Italy at that time.

The fruit of the Citron sometimes attains a very great size, weighing upwards of twenty pounds. It is not eaten, but the thick rind is much used to make a preserve. The juice being acid, is employed instead of that of the lemon and lime. Two essential oils are obtained from it, the oil of citron and that of cedrat; both are very fragrant, and much used in perfumery. They are essential in composition with the oil of lemons.

4. C. LIMONUM, *Risso.*—Petioles margined; leaves ovate-oblong, unequally crenate; flowers with 25–30 stamens; fruit oblong, rind firm, pulp acid.

Risso, *Ann. Mus.*, xx. 201; De Candolle, *Prod.*, i. 539; Lindley, *Flor. Med.*, 164.

Common Name.—Lemon-tree.

Foreign Names.—Limonier, *Fr.*; Limone, *It.*; Gemeine Citron, *Ger.*

Fig. 93.

C. limonum.
a Flower. *b* Fruit divided.

Description.—The Lemon-tree is an evergreen, about twenty feet in height, with flexible branches. The leaves are firm, alternate, ovate-oblong, of a bright green colour, shining, smooth, crenate or serrulate, and attached to a slightly-margined petiole. The flowers are large, white, with a tinge of pink on the outside, and arise from the smaller branches. The calyx and petals resemble those of the orange, already described. The stamens are numerous, being from 25 to 30. The ovary is ovate. The fruit is ovate-oblong, and terminated by a more or less elongated knob or nipple-like protuberance; externally it is of a straw-yellow colour. The rind consists of two coats, one thin and yellow, and abounding in a fragrant oil, the other thick and coriaceous.

There are numerous varieties of the Lemon, both as regards form and flavour; some being long, with large knobs, others ovate, others again pear-shaped, furrowed, &c.; some are extremely acid, whilst others are sweet. All, however, preserve the general characteristics of the species. This fruit, like the others before mentioned, is of Asiatic origin, and does not appear to have been introduced into Europe until long after the citron, being brought from the East at the time of the Crusades, the notices in the Roman writers, generally supposed to refer to this fruit, being, as has before been said, to the citron. This, as is observed by Mr. Royle, is confirmed by the fact, "that the Persian and Arabian

authors do not, as is their wont, give any Greek synonyme of either, but of the citron, which is supposed to have been known to the Romans."

The Lemon is now cultivated in all tropical climates; but the principal supply to our markets is from the Mediterranean, and especially from Sicily, though some are derived from the West Indies and other warm regions. The Lemon bears fruit much more freely, and of a better quality, in the artificial climate of a hot-house, than the orange, which seldom attains any perfection, at least in this country.

The juice and rind are officinal. The latter is pale yellow and rough, the colour darkening on drying. It has an aromatic and bitter taste, and an agreeable, fragrant odour; these properties are owing to the presence of a volatile oil and of a bitter principle. It is an aromatic stimulant, principally employed, however, as a mere flavouring ingredient, being seldom or never administered alone. The volatile oil (oil of lemons), although carminative and diaphoretic, is more used as a perfume, and to mask the taste of nauseous medicines, than as a remedial agent; some success has attended its employment as an external stimulant, especially in chronic inflammations of the eye.

The juice owes its sourness to the presence of the citric acid it contains, in combination with mucilage, extractive matter, some sugar, and water. Scheele was the first chemist who obtained this acid in a pure state. The process he devised is the same now employed, that of saturating the juice with chalk, and decomposing the citrate of lime thus formed, by means of sulphuric acid, when the vegetable acid is set free, and may be purified and crystallized. Citric acid thus obtained is extremely acid, but not as agreeable as the juice itself; it is, therefore, but seldom used in medicine, when the latter can be procured. It is, however, largely employed in the arts.

Medical Properties, &c.—Lemon-juice, as being one of the most grateful of the acids, is much used in the formation of refreshing drinks in febrile complaints, and also in the preparation of effervescing draughts. A mixture of this kind, made with one scruple of the carbonate of potash dissolved in an ounce of water, and half an ounce of lemon-juice, taken in a state of effervescence, is advantageously employed to check vomiting and to diminish morbid irritability of the stomach. But the juice appears to possess properties of a higher order: Whytt found that, given in half ounce doses, that it allayed the paroxysm of hysteria, and relieved palpitation of the heart. As a preventive to scurvy, this article is well known, and the only drawback to its general use is the difficulty of preserving it on long voyages. The crystallized citric has been substituted for it; but it has been found that this, although useful, is not equal to the juice itself. It has also been much recommended in poisoning by opium and its preparations; but, in general, the directions for its use are highly erroneous, as it is spoken of as an antidote for the poison, which it is far from being, as, if it is given whilst the poison remains in the stomach, it adds to its effect on the system, by rendering the morphia more soluble; but if it be administered after the removal of the narcotic, it is of much benefit, in restoring the powers of the stomach, and in giving relief to the patient. In the West Indies and South America, a cataplasm of the pulp mixed with common salt, is a usual remedy for the bites of venomous reptiles.

There are several other species or marked varieties of *Citrus*, among which the *C. acida*, or Lime, is very largely used for the preparation of citric acid. Almost all the juice that comes from the West Indies is obtained from this fruit, and not from the Lemon; it is more acid, but possessed of the

same properties. The *C. decumana*, or Shaddock, the Pampelmouse of the French, bears the largest fruit of any of the genus; the pulp is acid, and the rind, as well as the interior dissepiments, are excessively bitter. This rind is superior to that of the bitter orange for medicinal purposes, but is not used in medicine. The *C. bergamia*, or Bergamot, bears a fruit closely resembling the Lemon; some varieties of it are eatable, and others are used for preserves, as a substitute for citron, but its chief value is in the quantity of essential oil obtained from it. This article, well known under the name of *oil of bergamot*, is of a pale greenish colour, a very peculiar but agreeable odour, and is of greater specific gravity than any other of the essential oils furnished by the genus Citrus. Its only use is in perfumery.

Order 27.—AMYRIDACEÆ.—*Lindley.*

Flowers hermaphrodite, or sometimes unisexual by abortion. Calyx with 2—5 sepals, persistent. Petals 3—5, inserted below a disk, arising from the calyx, with a valvate but sometimes an imbricate æstivation. Stamens twice or four times as many as the petals, all fertile. Disk orbicular or annular. Ovary 1—5-celled, superior, sessile in or on the disk. Style solitary and compound. Stigmas equal in number to the cells. Fruit hard and dry, 1—5-celled, with its outer part often valvular. Seeds exalbuminous. Cotyledons wrinkled, plaited, or amygdaloid. Radicle straight.

The Amyridaceæ are all trees or shrubs, abounding in a balsamic juice, and having alternate or opposite leaves, which are ternate or unequally pinnate, sometimes with stipules, and occasionally with pellucid dots. They are all natives of tropical climates; one species only is found in the United States.

They are all more or less endowed with remedial properties, and several of them afford products recognised as officinal. Besides these, the resin of *Canarium commune* has the same properties as Balsam Copaiva, and the nuts, both raw and cooked, form an article of food in Java; though when raw, they are apt to create some disease of the bowels. The *Bursera paniculata* of the Isle of France yields a copious flow of a liquid oil, of a terebinthinate odour, which soon congeals into a camphor-like consistence. Several species of *Hedwigia* likewise afford resinous products, useful in medicine and the arts; thus, the Chibou resin is obtained from the *H. gummifera*, the Canara from the *H. acuminata*, and the Baume à sucrier from the *H. balsamifera.*

One of the resins, called Tacamahaca, is from a species of *Elaphrium*, and the *Icicas* furnish numerous articles of some utility; the incense wood being derived from *I. guianensis;* American Elemi from *I. icicariba;* American Balm of Gilead from *I. carana*, &c. Much of the Elemi of commerce is derived from the *Amyris hexandra* and *plumieri;* the wood of *A. balsamifera* furnishes one of the kinds of Lignum rhodium, whilst the *A. toxifera* is said to be poisonous. The leaves of *Balanites ægyptiaca* are stated to be anthelmintic, and the unripe fruit to be purgative. The bark of *Picramnia ciliata*, according to Martius, forms a good substitute for Cascarilla. In short, it would appear that there is scarcely a species belonging to this important order that does not possess some useful qualities.

Balsamodendron.—*Kunth.*

Flowers irregular. Calyx four-toothed, persistent. Petals four, oblong-linear. Stamens

eight, with elevated warts between them. Ovary single, supporting a short, obtuse style. Drupe ovate, acute, with four sutures. 1—2-celled. Cells 1-seeded.

This genus was formed by Kunth from certain species of Amyris, having the germen superior, and not inferior, and has been adopted by many botanists, but is not recognised by others, among whom is De Candolle.

1. B. Myrrha, *Nees.*—Stem shrubby. Branches squarrose, spinose. Leaves ternate. Leaflets obovate, obtuse, somewhat dentate at apex. Fruit acuminate.

Nees, *Besch. Offic. Planz.* liv. 17; Royle, *Mat. Med.* 335; *Protium Kataf*, Lindley, *Flor. Med.* 170.

Description.—A small shrubby tree, with spiny branches, having a pale gray or whitish-gray bark, with an aromatic smell. The leaves ternate on short petioles. The flowers are unknown. The fruit is ovate, brown, smooth, a little larger than a pea, attached to the persistent calyx, and supported on a very short peduncle. It is a native of Arabia, where it is said to be abundant. It furnishes a gum-resin, which is one of the varieties of Myrrh.

Fig. 94.

1. B. myrrha.
1, 2, 3. B. kataf.

The history of Myrrh is involved in great obscurity, and notwithstanding the recent discoveries and investigations on the subject, much remains to be known respecting it. It derives its name from Myrrha, the daughter of Cyniras, and who is said by the poets to have been changed into a tree, after having given birth to Adonis. An article under this name was known very early in the history of the world, and is always alluded to as exceedingly precious, and possessing an exquisite perfume and great virtues. Dioscorides speaks of eight kinds of it, and Pliny of seven, proving that several distinct substances were included in one common name. They state that it is derived principally from the country of the Troglodytes on the Red Sea, whilst Herodotus and Diodorus state that the trees which produce it are in vast abundance in Arabia. The first definite account of its origin is given by Theophrastus, who says that it is derived from a shrub with spiny branches, and leaves resembling those of the olive, agreeing in this with the more recent accounts.

Linnæus was of opinion that it was an animal product, and that it was caused by insects. By Bruce it was considered as derived from a species of *Mimosa;* Loureiro states that it was furnished by a *Laurus* found in Cochin-China, and Forskäl by a species of *Amyris*, which he calls *A. kataf;* finally, Ehrenberg and Hemprich discovered a plant in Arabia, exuding Myrrh, which proved to be very analogous to that described by Forskäl, and is even considered by Lindley to be identical with it; but, according to Dr. Royle, differs

much from Forskäl's specimen of *B. kataf* in the herbarium of the British Museum, as will be seen in the annexed cut. It was found in Arabia, in the vicinity of Gison, in great abundance, growing with Acacias and Euphorbias. This accounts for the origin of one of the kinds of Myrrh met with in commerce, the Turkey, which is stated to be collected in Arabia, and taken to Turkey by the route of Egypt, but leaves the same state of uncertainty as regards the source of the East Indian, which is said to be gathered in Abyssynia, and thence sent to the Indian ports. That these two kinds are not the product of the same district of country is proved by the fact, that the impurities or extraneous substances found mingled with them vary widely, which would not be the case, if both kinds came originally from the same place. It may prove, however, that they are the product of the same species, growing in different countries, more especially as the climate of the coast of Abyssinia is very analogous to that of Arabia.

Myrrh, as found in the shops, is in small fragments, called tears, or in masses composed of agglutinated portions of various shades of colour. When of good quality it is reddish-yellow, somewhat translucent, and possesses a peculiar aromatic odour, and a bitter, warm taste. It is partially soluble in water, alcohol, and ether. It has been often analyzed, the latest examination of it being by Brandes, who operated on specimens collected by Ehrenberg and Hemprich; in these he found volatile oil, about one-fourth of resin, one-half of gum, and several salts. The resin consisted of two kinds, one hard, in small proportions, and which presented some of the properties of an acid, the other soft, and probably a mixture of resin and volatile oil.

Medical Properties, &c.—Myrrh is a stimulant tonic; in small doses it promotes appetite and aids digestion, and appears to diminish excessive secretions from the mucous membranes. When administered in large quantities it acts as an irritant to the alimentary canal, excites fever, and creates much disturbance of the system. It also appears to have some special affinity to the uterus, though this is denied by many writers. It is given in a variety of complaints, though it is only calculated for cases where there is a diminution of vascular action, and a general relaxed condition of the system, or of some of the organs. In an atonic state of the stomach and bowels, it has proved highly useful, especially in combination with some of the preparations of iron, in which form also, it is very beneficial in those disordered conditions of the uterine system, attended with anæmia, as in chlorosis and some forms of amenorrhœa. It also forms a good external application in aphthous sore mouth, in a spongy or ulcerated condition of the gums, and to foul ulcers. When given internally in substance, the dose is from ten to thirty grains, either in powder, or suspended in water. It is but seldom given alone, being generally combined with the chalybeates, or with aloes or some of the fœtid gums, according to the indication to be fulfilled.

2. B. Gileadense.—*De Candolle.* Leaves ternate. Leaflets entire. Peduncles one-flowered, lateral.

De Candolle, *Prod.* ii. 76; Woodville, iii. 192; Stokes, *Med. Bot.* ii. 357; Stephenson and Churchill, iii. 157; *Amyris gileadensis*, Linn., *Mant.* 65; *A. opobalsamum*, Forskäl, *Arab.* 79; *Protium Gileadense*, Lindley, *Flor. Med.* 169.

Common Names.—Balm of Gilead, Balsam of Gilead.

Foreign Names.—Balsamier de la Mecque, *Fr.*; Balsamino di Gilead, *It.*; Gileadischer Balsamstrauch, *Ger.*

Description.—It is an evergreen shrub or small tree, seldom more than twelve or fourteen feet in height, with a flat top, giving it a stunted appearance. The trunk is about eight or ten inches in diameter, with many spreading, crooked, purplish branches, having protuberant buds, covered with an aromatic resin. The wood is resinous, light, of a reddish colour. The bark is smooth and ash-coloured. The leaves are thinly-scattered, small, composed of one or two pairs of opposite leaflets and an odd one; these leaflets are sessile, obovate, and of a bright green colour. The flowers are in threes; they are small, of a whitish colour, and furnished with small, somewhat bifid bracts. The calyx is persistent, and composed of four spreading sepals. The petals are four, oblong, concave, spreading. The stamens are eight, tapering, and erect, bearing erect anthers. The ovary is superior, ovate, and supporting a thick style, having a quadrangular stigma. The fruit is reddish-brown, ovate, somewhat compressed, four-valved, and containing a pointed smooth nut, marked on one side by a longitudinal furrow.

Fig. 95.

B. gileadense.
a. Cluster of flowers. *b*. Expanded flower.

This tree is found in many parts of Arabia and Abyssinia, and was formerly cultivated in Judea, as it was from Gilead in that country that the Egyptians derived the balsam. At present, according to Buckingham, not a plant of it is to be found; but Burckhardt states that it is still partially cultivated near the lake of Tiberias. It was also discovered by Bruce in Abyssinia, in company with the Myrrh tree, all along the coast to the Straits of Babelmandel; this agrees with the account of Josephus, who says, that according to tradition, it was introduced into Judea by the Queen of Sheba, when she visited King Solomon; though this tradition is erroneous, as will be shown.

This tree and its odoriferous balsam are noticed in the earliest records, and it appears to have always been held in high esteem. Thus in Genesis (xxxvi.) it is stated that the Ishmaelites carried it as an article of merchandise to Egypt. "A company of Ishmaelites came from Gilead, with their camels, bearing spicery and balm and myrrh, going to carry it down to Egypt." Now, as is observed by Bruce, this took place full a thousand years before the time of the Queen of Sheba, and shows that the plant had been transplanted into Judea long anterior to the period to which the tradition refers. On the other hand, it may be said that Gilead was merely the mart for such products, as these same merchants carried myrrh and spicery which certainly were not the growth of Judea.

The ancient profane writers constantly allude to this balsam. Pliny, in speaking of it, says, "but to all other odours whatever, the balsam is preferred, produced in no other part but the land of Judea, and there in two gardens only, both belonging to the king." This account agrees with that of Strabo, who states that it grew only in the king's garden at Jericho, showing that it was a cultivated and not an indigenous plant, and highly prized. In fact, it was of such consequence, that all writers treating on Judea

notice it. Vespasian and Titus each carried some of the balsam to Rome as a great rarity, and Pompey exhibited one of the trees at his triumphal entry. At the time of the visit of Alexander the Great to Judea, it was so scarce that all that could be collected during a summer's day was one spoonful; and it is stated that in the most plentiful year, not more than seven gallons were obtained in the whole country. Of course it bore a very high price, being sold at twice its weight in silver. There are three kinds mentioned by Pliny and others: the *Opobalsamum*, which was a green liquor found in the kernel of the fruit, the *Carpobalsamum*, expressed from the ripe fruit, and the *Xylobalsamum*, derived from the small twigs; but these names are differently applied by Lemery and other pharmaceutical writers of his day, designating by the first the balsam itself, by the second the dried fruits, and by the latter the twigs and branches.

At present the Balsam of Gilead or Mecca, as it is sometimes called, is procured from Arabia, and principally, according to Milburn, between Mecca and Medina. The best kind is said to exude naturally, but inferior qualities are obtained by boiling the branches. It is at first turbid, and white, of a strong, pungent, agreeable aromatic smell, and slightly bitter, acrid taste. When it is kept, it becomes thin, limpid, of a greenish hue, and afterwards yellow. As may be supposed, it is very liable to adulteration from its scarcity and high price. It was formerly supposed that an infallible criterion of its purity was, that when dropped on water, it formed a thin pellicle, which could be taken up, unbroken, with the point of a needle, but this, as is well known, will take place with any consistent balsam. Bruce states, the true article, when dropped on woollen cloth, may be washed off by simple water. According to an analysis of it by Trommsdorff, it consists of volatile oil, a soft resin insoluble in alcohol, and a hard resin soluble in that vehicle.

This balsam is in much estimation among the Asiatic nations, especially the Turks and Arabs, both as a medicine and perfume, and it is also employed as a cosmetic of undoubted efficacy in the harems, but from all that can be gathered, it possesses no virtues beyond those of the other turpentines, its excessive price being probably one great reason for the esteem it enjoys. In Europe, and this country, the drug known under the name of Balsam of Gilead, is the product of a native tree, the *Abies balsamea*, which, if not quite as fragrant, is equally efficacious as a medical agent. As to a quack remedy in great repute in England some years since, under the name of "Solomon's cordial balm of Gilead," it did not contain a drop of the balsam, but is said to have been a tincture of cardamoms with cantharides.

A species of this genus is mentioned by Mr. Griffith, (*Ann. Nat. Hist.* x. 194,) as being extensively cultivated in Affghanistan, on account of its stimulant and aromatic properties. The gum called *Bdellium*, so long known in medicine, but respecting whose origin so much uncertainty exists, and which has been attributed to so many different sources, is in part derived from one or more species of Balsamodendron; that observed by Adanson, in Senegal, and which he says is called Niouttout by the natives, is the *B. africanum*, whilst that from India, which is probably the kind known to the ancients, is said to be furnished by the *B. Roxburghii*.

BOSWELLIA.—*Roxburgh.*

Flowers bisexual. Calyx small, inferior, persistent, five-toothed. Petals five. Stamens

ten, inserted under a torus. Torus a crenate ring around the base of the ovary. Style one, caducous. Capsule triangular, 3-valved, 3-celled. Seeds solitary, winged.

This genus, which was established by Dr. Roxburgh, is peculiar to India, and has also received the name of Libanus from Colebrooke, from its Hebrew appellation. The species are all large trees, and all afford a resinous juice, and a wood which is heavy, hard, and durable.

B. SERRATA, *Roxburgh.*—Leaves pinnate, leaflets serrated, pubescent. Racemes simple, axillary. Petals ovate. Stamens inserted on the external margin of the torus.

Roxburgh, *Pl. Coromand.* v. 3; Ainslie, *Mat. Ind.* i. 264; Stephenson and Churchill, iii. 147; *B. thurifera*, Wight and Arnott, i. 174; Royle, *Mat. Med.* 333; Lindley, *Flor. Med.* 171; Colebrooke, *Asiat. Research.* ix. 377.

Description.—A lofty tree, with the leaves at the extremity of the branches. The leaves are pinnate, consisting of about ten pairs of obliquely, oblong, obtuse, serrated, villous leaflets, with a terminal one, sometimes opposite, sometimes alternate, on short, round, pubescent petioles. The flowers are in simple axillary racemes, shorter than the leaves, numerous, small, of a pale pink colour, and furnished with minute bracts. The calyx is small, five-cleft and downy; the petals are oblong and spreading, villous externally, and much longer than the stamens; these are ten in number, inserted on the outer edge of a cup-shaped torus or nectary, which is crenated and fleshy, surrounding the ovary; the stamens are alternately shorter, and support oblong anthers. The ovary is superior, ovate, and bears a cylindrical style with three lobed stigmas. The fruit is a three-angled, smooth capsule, having three cells opening by the same number of valves, and each containing a single seed, which is broad, cordate at base, deeply emarginate, with a long slender point.

Fig. 96.

B. serrata.
1. Single expanded flower.

This Boswellia occurs in some abundance in the mountainous districts of Central India, and another species, the *B. glabra*, also affording a fragrant resin of the same character as Olibanum, is found in the northwestern parts of the same country. These two species furnish the Indian drug, whilst that called African, and imported from Egypt, and originally obtained from Arabia and the eastern coast of Africa, is the product of a tree which is stated by Capt. Kempthorne, (Harris, *Highlands of Ethiopia*, App. iii.,) to grow from the bare rocks; he says, "from the base of the trunk, and about treble its diameter, a very round, thick substance is protruded, of a nature between bark and wood. This adheres most firmly to the stone, and at a distance resembles a mixture of mortar and lime. From the centre of the mass, the stem, having taken a bend or course outwards of several inches, rises straight up to a height of forty feet. It throws out at the top short branches covered with a bright-green folliage, the leaves being narrow and rounded at the end, five or six inches long by one broad, crimped like the frill of a shirt. From a foot to eighteen inches is the usual girth of the stem, and it tapers gradually away to the summit. The bark is perfectly smooth, and consists of four layers." "The inner of all is about an inch thick, of a dull, reddish hue, tough, not

unlike leather, but yielding a strong aromatic perfume." He further states that on an incision being made into it, a milky juice exudes which soon hardens, and that the young trees produce the best gum. This gum is collected by the natives and sold to the Arabs, by whom it is sold to the merchants. Royle, (*Mat. Med.* 333,) states that this tree has been identified by Mr. Bennet, of the British Museum, with *Plöslea floribunda*, Endlicher, but that it appears to be a *Boswellia*.

At one time it was generally supposed, on the authority of Linnæus, that Olibanum was obtained from the *Juniperus lycia*, a native of the south of Europe; but this was found to be erroneous, and it was then attributed to several different plants. Mr. Colebrooke has, however, satisfactorily shown that what comes from India, is afforded by the Boswellia under consideration, but it is very likely that the variety from Africa is derived from other plants. That from India is esteemed the best, and is by far the most common in commerce.

Olibanum, or Frankincense, was well known to the ancients, and was used by them as now by Roman Catholics, in their religious ceremonies. It is the Lebonah of the Hebrews, and is noticed by Moses in Exodus (xxx.); their knowledge of it was most probably derived from the Egyptians, who, like all the pagan nations of antiquity, used it largely as an incense to mask the unpleasant emanations arising from the sacrifices offered in their temples. The article then used, was all mostly derived from Abyssinia and Ethiopia, as the communication with India at that time, especially by the Greeks and Romans, was very uncertain, though the more eastern nations of Egyptians and Hebrews had a large commerce with that distant land.

Olibanum is now rarely used in medicine, though formerly it was employed in chronic discharges from the mucous membranes, and formed an ingredient in several stimulating plasters. An analysis of it by Braconnot, shows that it is composed of about one half of a resin soluble in alcohol, of a gum soluble in water, of a resin insoluble in either, and of some volatile oil. It is in the form of semi-transparent masses or tears, of a pale yellowish or pink colour, solid, hard and brittle. It has a bitterish acrid taste, and when chewed, sticks to the teeth and renders the saliva milky.

Order 28.—CEDRELACEÆ.—*R. Brown.*

Sepals 4–5, united or distinct. Petals as many as the sepals, distinct, sometimes unguiculate; æstivation twisted. Stamens twice as many as the petals, unequal, some abortive; filaments united in a tube, or distinct, inserted on a hypogynous disk; anthers introrse. Ovary with as many cells as petals, surrounded by the discoid torus; styles and stigmas united into one, the latter 3–5-angled, discoid. Fruit, a woody 2–5-celled, 3–5-valved capsule with septicidal dehiscence. Seeds anatropous, many or few in a cell, imbricated in two rows, flat and winged, not arilled; albumen thin and fleshy or none. Embryo with thick foliaceous cotyledons and a very small radicle.

This order is very closely allied to the next in many particulars, but differs in the æstivation and in the seeds. It consists of trees with a very hard and durable wood, which is often fragrant and resinous. The leaves are alternate, pinnate, and exstipulate. The flowers are in terminal panicles, perfect, or sometimes diclinous by the abortion of the ovary or stamens. They are natives of warm climates, and many of the species are of great importance in the arts: thus, the wood of the *Swietenia mahogoni*, and perhaps other species affords the Mahogany so much used in furniture; the *Cedrela odorata*, that employed for the boxes in which segars are packed. Others, again, as

the *Soymida febrifuga*, the *Cedrela toona*, &c., are possessed of remedial powers. The whole of the species in fact are more or less tonic and astringent.

SOYMIDA.—*Jussieu.*

Sepals 5. Petals spreading, unguiculate. Stamen tube cup-shaped, 10-lobed, each lobe 2-toothed, with an anther between the teeth below. Ovary on a disk covering the bottom of the tube, 5-celled; ovules 12 in each cell. Style short, equal, 5-angled; stigma peltate, 5-angled. Capsule, oblong obovate, 5-celled, 5-valved, dehiscing from the apex, with a thin woody sarcocarp becoming detached from the endocarp, and both from a large permanent 5-angled axis. Seeds pendulous, winged.

This genus, which is very closely allied to Swietenia, and is included in it by many eminent botanists, consists of trees with abruptly pinnate leaves, having 3–6 pair of opposite leaflets. It is peculiar to the East Indies.

S. FEBRIFUGA, *Jussieu.*—Leaves alternate; leaflets 3–4 pair, elliptical, obtuse or emarginate, unequal at base. Panicles terminal, divaricate.

A. Jussieu, *Meliac.* 98 t. 26; Wight and Arnott, i. 122; Lindley, *Fl. Med.* 155; Steph. and Church. ii. 81.

Description.—A lofty tree with a straight trunk of great thickness, and covered with a gray, rugose, cracked bark. The branches are numerous, the lower ones spreading, the upper ascending, forming a large head. The leaves are alternate and abruptly pinnate, large and composed of three or four pairs of opposite, petiolate, oval, obtuse or emarginated leaflets, which are smooth and shining, of a bright-green colour. The flowers are very numerous, middle-sized, white and inodorous, disposed in panicles arising from the axils of the upper aborted leaves, and hence appear terminal with small bracts. The calyx is inferior, five cleft, oval and deciduous. The petals are five, obovate, obtuse, concave and spreading. The stamens are ten, united into a tube with the anthers at the mouth within. The ovary is conical, surmounted by a thick tapering style, crowned with a large discoid stigma. The capsule is large, ovate and 5-valved, the valves gaping at top. The seeds are numerous, imbricated, obliquely cuneate, and furnished with a large membranous wing.

This tree is a native of many parts of the East Indies, where it is called *Soymida* by the Telingas, and *Shemmarum* or red-wood tree, on the Coromandel coast. It flowers about the end of the cold, and beginning of the hot season, and ripens its seeds in three or four months. The wood is of a dull red colour, very hard and heavy, and is esteemed by the natives as the most durable the country affords. The bark, which is the part used in medicine, is of a dingy red colour, and has a rather pleasant bitter taste, with a slight degree of astringency; it is brittle, and is covered externally with a rough, gray epidermis.

It was first brought to the notice of the profession by Dr. Roxburgh, who found it in use among the Hindoo practitioners. It has attracted, however, but little attention in this country or Europe, but is said to be extensively used by the army surgeons in India in all cases in which cinchona is indicated.

Medical Properties, &c.—This bark is tonic and astringent, and has been found efficacious as a febrifuge in intermittent and remittent fevers. Mr. Breton, who published a paper on it in the Medico-Chirurgical Transactions (v. ii.), states that in these diseases he has put the bark to the fairest possible test, and with uniform success, and is of opinion that it answers every purpose of the Peruvian, in allaying irritability and restoring strength. This is confirmed by the testimony of many practitioners, who all agree in support of the observations of Mr. Breton, and add that it is better retained on the stomach when in substance and in greater quantities than cinchona. Dr. Ainslie (*Mat. Ind.* i. 124) also recommends it, but says that if the doses

exceeded four or five drachms in the twenty-four hours, there was a derangement of the nervous system with vertigo and subsequent stupor.

Dr. Roxburgh is of opinion that the bark should be collected when the sap begins to ascend, and that the small or middle-sized branches furnish the best. The dose in substance is from one to five drachms a day; it may also be given in infusion and tincture.

The barks of the other species of this order are possessed of much the same powers: thus, that of the *Swietenia mahogoni* is used in the West Indies as a tonic and febrifuge, but is far inferior to cinchona. It may be mentioned that Blume describes a species of *C. edrela* which he calls *febrifuga*, occurring in the island of Java, where it is known by the natives under the name of *Suren*, which is highly esteemed in the treatment of the malignant intermittents of that island. This tree has been thought to be the same as the *C. toona* of Roxburgh, but it is more than probable that it is identical with the *Soymida febrifuga*, with the characters of which it agrees in all respects. Horsefield used it in the latter stages of dysentery with much benefit, and Forsten (*Diss. de Cedrel.*) is of opinion that it is very beneficial in bilious fevers and in protracted diarrhœa kept up by atony of the muscular fibres. *Khaya Senegalensis* is a native of Senegal, noticed by Batka under the name of "Quinquina de Senegal," as having very bitter bark, found useful in the fevers of the country; it is always given in infusion or decoction, never in substance; it is considered by De Candolle and others to belong to *Swietenia*.

The tree noticed by Dr. Hancock (*Trans. Med. Bot. Soc.* 1834) under the name of *Juribali* or *Euribali*, a native of Pomeroon, probably belongs to this order or the next, though his description is too imperfect, to be even certain of this. The bark is a powerful bitter and astringent, and is stated to be more effectual than cinchona in fevers of a malignant or typhoid type. It does not constipate the bowels or affect the head, but generally opens the pores and promotes perspiration. To render it more active, it should be given in a warm decoction. Dr. Hancock observes in addition, that another tree, the *Icica altissima*, is often known under the name of Juribali, and is also febrifuge (*Journ. Phil. Coll. Pharm.* v. 144).

Order 29.—MELIACEÆ.—*Jussieu.*

Sepals 3–5, somewhat united at base. Petals 3–5, hypogynous, cohering at base, sometimes unequal, æstivation imbricated. Stamens of the same number as, or double the number of the petals, monadelphous at base, inserted on the outside of the torus. Anthers sessile, within the ring of filaments. Ovary 3–5-celled, each cell containing 1–2 ovules. Styles and stigmas usually united into one, 3–5-lobed. Fruit drupaceous, baccate, or capsular, 3–5 celled, each 1–2 seeded, when dehiscent, loculicidal. Seeds never winged or flat, albumen scanty or none.

The Meliaceæ consist of trees and shrubs, with alternate or occasionally somewhat opposite leaves, which are simple or pinnate and exstipulate. They are found in most parts of the world, but principally in warm climates, the extra-tropical species being few. Their usual qualities are those of the bitters and astringents; but in some of them other and more powerful properties are present. Several species of *Trichilia* are very active; the *T. cathartica* is a violent purgative, and at the same time is excessively bitter. According to Martius, it is given in fevers, dropsies, &c. (*Jour. Chim. Med.*, iii. 498). The *T. emetica* has emetic roots, but its fruit is eatable, though its seeds are acrid, and are used to cure the itch. *T. glabra* is a powerful pur-

gative. The juice of the bark of *Guarea trichiloides* is also an active purgative and emetic (*Aublet. Guy*, iii. 437). The bark of *T. moschata* has the odour of musk, and is said by Hancock to be eminently febrifuge; it is very bitter, and tinges the saliva of a red colour. The berry of *T. spinosa* affords a stimulating, fragrant oil, employed in India in chronic rheumatism and paralytic affections (*Ainslie*, ii. 71). The plant called *jito*, in Brazil, which operates so violently upon the bowels as to be, in the opinion of Piso, rather a poison than a medicine, is supposed by Lindley to be a species of *Guarea*, perhaps the *G. purgans*, which Martius says acts powerfully on the uterus, and in an over-dose will cause abortion.

The root of *Sandoricum indicum* is aromatic, and is used in cases of leucorrhœa, combined with the bark of the root of *Carapa obovata*, which is bitter and astringent. The bark of *C. guianensis* is eminently febrifuge, and contains a peculiar bitter principle (*Jour. de Pharm.*, vii. 348); the oil of its seeds is bitter and anthelmintic, and is poisonous to insects (*Perrotet, Ann. Soc. Lin.*, 1824). An alliaceous odour is so marked in the fruits of some species (*Dysoxylon*, *Epicharis*, &c.), that they are used in some parts of Java as a substitute for garlic. Some of these plants furnish edible and pleasant fruits, especially those of the genus *Lansium* and *Milnea* (*Royle, Illus.* 141).

Melia.—*Linn.*

Calyx small. Sepals united below. Petals oblong, spreading. Stamens 10, united into a tube, bearing the anthers in the orifice. Ovary on a short disk, 5-celled. Style with a 5-lobed stigma. Drupe ovate, with a 5-celled bony nut. Cotyledons foliaceous.

This genus derives its name from the resemblance of its principal species to those of the ash, *Melia* of the Greeks. The species closely resemble each other in their appearance and properties, and are all natives of Asia. They have long been known, and were described by the earlier writers, under the name of *Azedarach*, which was unnecessarily changed by Linnæus to that it at present bears.

M. azedarach, *Linn.*—Leaves deciduous, bipinnate; leaflets smooth, obliquely ovate-lanceolate, dentate, acuminate. Petals nearly glabrous.

Linn., *Sp. Pl.*, 550; De Candolle, *Prod.*, i. 621; Lindley, *Fl. Med.*, 151.

Common Names.—Pride of India, Pride of China, Bead-tree, &c.

Foreign Names.—Azedarach commun, *Fr.;* Pater Nostri di S. Domenico, *It.*

Fig. 97.

M. azedarach.

Description.—A tree thirty to forty feet high, with spreading branches. The bark is scabrous on the trunk and large branches. The roots are horizontal, rather superficial, extending to a considerable distance. The leaves are large, alternate, bipinnate, each pinnule with five opposite, ovate-lanceolate, acute, dentate leaflets. The flowers are odorous, of a light violet colour, forming a drooping panicle, arising from the axil of the upper leaves. The calyx is very small, and is formed of five obtuse, slightly-pubescent sepals, united at base. The petals are much longer than the calyx, spreading, oboval, and obtuse. The stamens are united into a tube, which is rather shorter than the petals, dilated at base, of a dark violet colour, and 10-toothed; each tooth being bifid, it appears 20-toothed, except on close inspection. The anthers are bilocular, alternate with the dentures of the tube, and attached to its inner surface. The ovary is globular, surmounted by a thick style, which is terminated

by a small 5-lobed stigma. The fruit is a fleshy berry, of an ovoid shape, about the size of a cherry, and containing an elongated nut, which is 5-celled and 5-seeded.

The Pride of India is a native of many parts of Asia, but has long been naturalized in the southern parts of Europe, where it was probably introduced from Syria, after the conquest of that country by the Romans. Pliny speaks of it as not being uncommon, and was apparently acquainted with its properties. It is also naturalized in the warmer parts of the United States; it is said to have been introduced into Georgia and Carolina soon after the settlement, and has now become as common as if originally a native. It succeeds perfectly well as far north as Virginia, and will sometimes survive for a few years in Pennsylvania; but is most generally destroyed by the severity of the winters, even when, by care and attention, it may have attained some size.

Rafinesque states that it is a native of Arkansas and Texas, but does not give any authority for the assertion; and Dr. James found it on the Canadian apparently in a wild state. All other writers on American plants unite in declaring it to be of foreign origin; and it is probable that the plants found in a wild state owe their origin to the seeds having been dispersed by birds, as some species feed eagerly on the berries.

The early medical history of this plant is involved in much uncertainty; for although it appears to have been used in India for a long time, the first certain account of it is given by Avicenna, who notices its narcotic properties. It does not seem, however, to have attracted much attention in Europe, being only valued for the hard nuts contained in its berries, for the purpose of making rosaries, for which they are extensively used in Roman Catholic countries; hence its name of Bead-tree, &c. The writers of the middle ages allude to it very briefly, and chiefly on account of the pulp of its fruit, as the basis of an ointment for the destruction of lice and other parasitic insects. In this country it appears to have been used as an anthelmintic very soon after the settlement, and was at one time in considerable repute, though at present but seldom employed.

Medical Properties, &c.—The most efficient part is the bark of the root, which has a bitter, nauseous taste, and an unpleasant, virose smell. Its active principle appears to be volatile, as it is much more efficient in a fresh than in the dried state. It is endowed with marked anthelmintic powers, and in large doses is narcotic and emetic. Dr. B. S. Barton says that it is one of the most valuable articles of its class ever discovered; and Dr. Kollock, of Georgia, uses the following language with regard to it. "It is a vermifuge of efficacy. Its use is, in some measure, general among the planters, and with many supersedes the use of all others. I have given it with success, where all others in common use have failed of relieving. But when given in the months of March and April, when the sap is mounting into the tree, it has been followed by stupor, dilatation of the pupil, stertorous breathing, &c.; but these symptoms, like those sometimes produced by spigelia, pass off, without any perceptible injury to the system." Other writers speak in the same high terms of it. Ainslie (*Mat. Ind.*, ii. 453) says, that in Cochin China it is well known to native practitioners, and used as an anthelmintic, but given with great caution, from its liability to induce vertigo and convulsions. This bark is given in substance, in doses of twenty grains; but the usual form is in decoction, made with two ounces of the root to a pint of water, boiled down to a half. Of this a tablespoonful is given every few hours, till it produces the desired effect, to be followed by an active cathartic.

The leaves are also endowed with some activity. Merat and De Lens

state that a decoction of them is purgative; but they appear rather to be analogous to those of the other species in their properties, tonic and astringent. They are eaten by cattle with perfect impunity.

The berries, which have a sweetish pulp, are also said to be anthelmintic, but only in large doses. Sometimes, however, they cause unpleasant effects; thus M. Tournon gives a case in which convulsions, and the most copious vomiting and purging were induced by the ingestion of a few of them (*Jour. Gen. de Med.*) The nuts furnish much oil on expression, which is used as a vermifuge by the Javanese, and is also esteemed as an application to foul ulcers, and as a liniment in rheumatic and spasmodic disorders. Michaux states, that an ointment prepared from the pulp, is employed in Persia, in cases of tinea capitis and other obstinate cutaneous affections.

All the other species of Melia are possessed of active qualities; but the most important is the *M. azederachta*, which differs from the last-mentioned species mainly in having simple pinnate leaves. The medical properties of this are, however, very different; as Ainslie states that the bark is bitter and astringent, and is considered by the Hindoo practitioners as amongst their most valuable tonics, and they employ it for every purpose to which cinchona is applicable, and with fully equal success. He is also of opinion that it contains a principle analogous to quinine. A sort of toddy is also obtained from this tree, and the *M. sempervirens*, which is prescribed in India as a stomachic.

Canella.—*Swartz.*

Sepals 5. Petals 5, somewhat coriaceous, æstivation contorted. Stamens 15, connected, with 15 furrowed anthers. Stigmas 3. Berry 3-celled (or by abortion 1); cells 1—2-seeded.

A genus of a single species, respecting which much confusion formerly existed among botanists, from its being confounded with the *Drymis winteri*. This latter, as mentioned when treating of it, was discovered by Captain Winter, in 1579; and, in honour of him, was called *Cortex winterana* by Clusius. In the beginning of the seventeenth century the present bark was introduced, and noticed by the same writer under the name of *Canella;* this, Parkinson, in his *Theatrum*, has mistaken for the Winter's bark; but Bauhin was the first who confounded the names, by styling the Cortex winteranus, Canella alba; and although Sir Hans Sloane gave separate descriptions of them in the Transactions of the Royal Society, these were so little attended to, that not only Lemery, Pomet, and other writers on the Materia Medica, considered them as identical, but even Linnæus included them both under the name of *Laurus winterana*, but afterwards established the Canella as a distinct genus, calling it *Wintera*, thinking that it was the tree furnishing the bark discovered by Captain Winter. Of late years this having been again found, and the tree described, no further mistake can arise. The two plants grow in different parts, and belong to very different natural orders.

C. alba, *Murray.*—Flowers in terminal corymbs; leaves coriaceous, spathulate, and obtuse.

Common Names.—White canella, Wild cinnamon.

Foreign Names.—Canelle blanche, *Fr.;* Canella bianca, *It.;* Wiesser zimmet, *Ger.*

Swartz, *Trans. Lin. Soc.*, i. 96; Woodville, ii. 318; Stokes, *Med. Bot.*, iii. 12; Stephenson & Churchill, ii. 66; *Winterana canella*, Linn.; *Sp. Pl.*, 636.

Description.—A tree of considerable size, with a stem of from 10 to 50 feet in height, very straight and upright, and branched only near the top. The branches are erect, not spreading, and furnished with petiolated leaves, which are irregularly alternate, oblong, obtuse, entire, of a dark-green colour, coriaceous, and shining. The bark is whitish. The flowers, which grow at the extremities of the branches in clusters, are of a violet colour, and are seldom fully expanded. The calyx is 5-leaved, and persistent; the sepals are roundish, concave, smooth, and membranous. The petals are much longer than the sepals, oblong, concave, erect, two somewhat narrower than the others. The stamens are monadelphous, forming an urceolate tube, to the outer side of which the anthers adhere. The ovary is superior, ovate, 3-celled, bearing a cylindrical style, with three convex, blunt stigmas. The fruit is an oblong, fleshy, smooth, black berry, which is 3, or by abortion, 1-celled, and 1—2-seeded. The seeds are exalbuminous, with linear cotyledons.

Fig. 98.

C. alba.
1. Petals and stamens. 2. Style. 3. Seed. 4. Berry.

The Canella is common in most of the West India Islands, and in South America. Every part of it is aromatic; and when it is in flower, the perfume is perceived at a considerable distance. The flowers retain much of their odour when dried; and if they be moistened with warm water, the scent becomes very powerful, approaching that of musk. The leaves have somewhat the smell of those of the bay. The fruit, which is not unlike, both in taste and odour, that of the sassafras, is a favourite food of the wild pigeons in Jamaica, and imparts a peculiar taste to their flesh, which is much admired by epicures.

The bark of the Canella, as found in the shops, is partly in quilled pieces, which are of a whitish-yellow colour, or in flat fragments, which are thicker, and rather darker. The smell is very aromatic, the taste also aromatic, more like that of the clove than the cinnamon, warm, pungent, and somewhat bitter. It gives out its virtues to alcohol, and partly to water; but the infusion, though bitter, has very little aroma. An analysis of it by Petroz and Robinet, shows that it contains volatile oil, resin, bitter extractive, canellin, gum, &c. It owes its properties to the three first of these constituents, principally to the oil, which is often used to adulterate oil of cloves. The canellin is a saccharine substance, which is very analogous to, if not identical with mannite.

Medical Properties, &c.—On account of its aromatic qualities, Canella is employed to cover the taste of several disagreeable-tasted articles of the Materia Medica, and enters into the composition of a well-known and popular purgative, the *Hiera picra* (Pulvis aloes cum canella); added to the tincture or infusion of senna, it covers the nauseous taste of those articles, renders them more grateful to the stomach, and prevents them from griping. It is seldom used alone; though from its stimulating and aromatic properties, it might be useful where remedies of this character were indicated. It appears more useful as a condiment than as a medicine; for Swartz states that it

was constantly employed for this purpose by the Caribs, and still forms an ingredient of many dishes among the negroes. In Martinique the berries constitute the basis of a much-esteemed cordial.

Group XII.—Rutales.

Order 30.—ANACARDIACEÆ.—*R. Brown.*

Flowers perfect or diclinous, regular. Sepals 5, or 3—4—7, usually persistent. Petals as many as sepals, or wanting; æstivation imbricated. Stamens as many as petals, or sometimes more, distinct, with introrse anthers. Ovary solitary, free, 1-celled, with a solitary ovule; styles 3 or 4—5. Fruit indehiscent, commonly drupaceous, 1-seeded. Seed erect or suspended, exalbuminous, with a more or less curved embryo, and very thick and fleshy, sometimes foliaceous cotyledons.

This order is composed of trees or shrubs having a resinous, gummy, or milky caustic juice. The leaves are alternate, simple or ternate, or unequally pinnate, without any pellucid dots. It formerly was included in the Terebinthaceæ, but was separated by Brown; as now constituted, it may be distinguished by the seeds hanging from a thread, which rises from the base of the carpels, which are usually solitary or distinct, and sometimes, when mature, on a very large disk. The species are principally natives of tropical climates, but some are found beyond these limits, especially those belonging to *Rhus*.

The general characters of these plants are acridity and causticity in the bark and leaves, though the fruit is often edible and delicious. That of the Mango (*Mangifera*) is deservedly esteemed, and is considered one of the finest of the tropical productions; and those of several species of *Spondias* are also in much repute; the best is that of the *S. dulcis*, which has been compared to the Pine apple in flavour and aroma; the juice of the *S. tuberosa* is used in Brazil in fevers, and the bark of the *S. venulosa* as an aromatic astringent, in diarrhœa, gonorrhœa. The fruits of *Anacardium occidentale* and *Semecarpus anacardium*, are enlarged and fleshy receptacles, supporting a reniform seed. This receptacle is edible and cooling, but is not much used, except for sweetmeats. The nut has an exterior covering, formed of two laminæ, between which is a caustic, bitter juice, which stains an indelible black, and is capable of causing, in most persons, an erysipelatous eruption, resembling that produced by the Poison Vine, but even more severe; it is sufficiently acrid to destroy warts, corns, &c., and is sometimes used for such purposes. The almond is white, of an agreeable taste, and furnishes an oil which is said to be anthelmintic. The nut is roasted, to drive off the acrid juice of the shell, before it is eaten.

Many of these plants abound in a viscid juice, which soon turns black, and is much used for varnishes. That most generally employed is from the *Semecarpus anacardium* and *Melanorrhœa usissatissima*. These varnishes are very poisonous to most persons, affecting them like the Cashew nut above spoken of. The black varnish of Japan is from the *Stagmaria verniciflua*. Several others of these plants furnish an analogous product, as the *Augia chinensis*, *Odina wodin*, *Buchanania latifolia*, &c.

The *Schinus molle* is so replete with a resinous juice, that if its leaves are broken and thrown into water, the resin escapes so rapidly as to give them the appearance of spontaneous motion. The resin of the bark is used in Peru, and said to be purgative, and also to strengthen the gums. The fruits are made into an intoxicating liquor by fermentation. (*Feuillée Plant. Med.*

iii. 43.) The *S. arroeira* is said to poison those who sleep beneath it; but a fragrant oil is obtained by distillation from its leaves, and its bark is employed as a febrifuge in Brazil, according to Buchner (*Jour. Chim. Med.* vi. 204); it contains a large proportion of tannin, and the extract forms a good substitute for catechu.

Rhus.—*Linn.*

Sepals 5, united at base, persistent. Petals 5, ovate, spreading. Stamens 5 (rarely 10), equal. Styles three, short, distinct, or united. Stigmas 3. Fruit drupaceous, almost dry. Root bony, 1-celled. Seed solitary, suspended on a funiculus, arising from the base of the nut.

This genus is extensive, and the species are found in all parts of the world, but are most numerous in Southern Africa. In North America there are about ten or twelve, belonging to different sections or sub-genera, which might with advantage be considered as genera. They are shrubs or very small trees, with simple or unequally-pinnate leaves. Their medical properties vary much, some of the species being extremely poisonous, whilst others are innocuous, and afford agreeably acid berries. Several species are officinal in the U. S. and other Pharmacopœias.

R. toxicodendron, *Linn.*—Stem erect, decumbent, or climbing. Leaves trifoliate, somewhat pubescent. Leaflets angularly incised, or entire, the lateral ones inequilateral. Flowers in axillary, sub-sessile racemes. Fruit sub-globose, smooth.

Linn., *Sp. Pl.* 381; Torrey and Gray, *Fl.* i. 218; Stokes, ii. 160; Stephenson and Churchill, iii. 167; Bigelow, *Med. Bot.* iii. 17.

Common Names.—Poison Oak; Poison Ivy; Poison Vine, &c.

Foreign Names.—Sumac vénemeux, Herbe à la puce, *Fr.*; Geft-Sumach, *Gr.*; Albero del veleno, *It.*

Description.—The root sends up many stems, which are either erect, decumbent, or when they meet support, ascend a wall, fence, or tree, in the same manner as ivy, by radicles thrown out at intervals. The bark is a brownish-gray colour. The leaves vary much, in the erect varieties being usually entire, or variously and irregularly sinuate-toothed or lobed, whilst in the climbing kinds they are almost entire or nearly so; in all cases they are smooth on the upper surface, but more or less pubescent beneath. The lateral leaflets are always inequilateral, nearly sessile, and smaller than the middle ones. The flowers are in simple, axillary racemes, on very short peduncles, of a whitish-green colour. The calyx is small, permanent, and divided into five segments. The petals are also five, ovate, acuminate, and spreading. The stamens are shorter than the corolla, and support small roundish anthers. The ovary is superior, roundish, and is crowned by a short style, bearing three small, cordate stigmas. The fruit is a globular, smooth, dry berry, containing a single bony seed.

Many botanists have considered the varieties of this plant as distinct species, under the names of *toxicodendron* and *radicans*, but it is now well ascertained that they are not entitled to this rank. Dr. Bigelow observes, "Among the plants which grow abundantly round Boston, I have frequently observed individual shoots from the same stock having the characters of both varieties. I have also observed that young plants of *R. radicans* frequently do not put out rooting fibres, until they are several years old; and that they seem in this respect to be considerably influenced by the contiguity of supporting objects." This agrees with my own observations of the plant, and is the opinion of our best authority on such subjects, Drs. Torrey and Gray, as well as that of Michaux and Pursh.

The Poison Oak was early noticed, and was described in 1635 by Cornu-

tus in his work on the plants of Canada, as a species of Ivy. It was known to the Indians both as a poison and as a medicinal agent, and the effects of emanations from it were mentioned by Kalm and other travellers in North America, but it does not appear to have been introduced into medical practice until about 1788, when Du Fresnoy, a French physician, made some trials with it, in the treatment of obstinate cutaneous affections, which were successful; he also administered the extract in several cases of paralysis, four of which he states were cured by it. Some years afterwards it was experimented upon by Dr. Horsefield, who found that it possessed the properties of an acro-narcotic, and when given in small doses, that it acted upon the stomach as an immediate stimulant, causing heat and uneasiness, and afterwards promoting perspiration and diuresis. It has subsequently been tried by a great number of practitioners, both in Europe and this country, in a variety of complaints, but with limited success.

The poisonous effects of this plant on certain persons, and the exemption of others from its influence, are universally known. Those, who by a peculiar idiosyncrasy are obnoxious to its power, experience its ill effects merely by approaching the plant, whilst in others it requires a direct application of the juice to produce such a result, but fortunately the great majority of persons are wholly unsusceptible, and may handle it with impunity; were this not the case a large proportion of our agricultural population would be perpetually sufferers from it, as it is so commonly diffused as to render it almost impossible to avoid it. The symptoms caused by it, are violent itching, redness, and tumefaction of the affected parts, especially of the face, succeeded by heat, pain, vesication and fever. In some cases the skin becomes covered with a crust, and the swelling is so great as to obliterate the features. These symptoms begin in a few hours after exposure to the poison, and are usually at their height on the fourth or fifth day; after which desquamation begins, and the distress diminishes. In some instances the eruption is less general, and is confined to the part exposed to actual contact with the poison; in others, again, the eruption continues a long time, one set of vesications succeeding another, so as to protract the disease for an indefinite period.

The juice of the Poison Vine, is yellowish and milky, but on exposure to the air, becomes of a permanent black colour, and when applied to linen or cotton, forms an indelible dye, not being subject to fade from age, washing, or the application of the usual chemical agents. This quality of the juice is probably attributable to a peculiar principle which exists in almost all vegetables which possess the power of poisoning, when applied to the surface or by emanation; as it is found in the Upas, the Manchineel, the Cashew apple, &c.

Medical Properties, &c.—It has been most successfully employed in paralysis, in which it appears to act somewhat like Nux vomica, but not with equal power. It has also been used in chronic rheumatism, diseases of the skin, and some affections of the eyes, but the success hitherto attendant on its employment, do not counterbalance the risk of producing its poisonous consequences, and it is at present seldom or never resorted to by practitioners. It is given in powder, in doses of half a grain, gradually increased until some effect is produced; it has also been advised in decoction, infusion and extract, but as it appears that the active principle is very volatile, it is less efficient in these forms than in substance.

Many other species of Rhus possess the same properties, in a greater or less degree, among which *R. venenatum* and *R. pumilum*, both natives of this country, are exceedingly active, and have a powerful influence on persons unsusceptible to the action of the *R. toxicodendron*. The first of these affords a brilliant black varnish, very analogous to that obtained in Japan from the *R. ver-*

nix, with which it was at one time confounded; this varnish is also procured from the *R. sinense*, and *R. succedaneum*, both natives of China and Japan.

Another group of the genus possesses wholly different properties, the species comprising it being astringent and tonic, and wholly destitute of poisonous qualities. Thus the *R. coriaria* and *R. cotinus*, have been used as substitutes for Cinchona, and as astringents in bowel complaints, whilst their leaves, especially those of the first, are largely employed in the tanning of Morocco leather, as are also those of our native species, the *R. copallinum*, *glabrum* and *typhinum*.

The *R. glabrum* is recognised as officinal in the secondary list of the United States Pharmacopœia. It is a shrub from four to twelve feet in height, with large pinnate leaves, and large, erect, terminal thyrses of greenish-red flowers, succeeded by clusters of crimson berries, covered, when mature, with an acid efflorescence. These berries have a sour, astringent taste, and are often used for the purpose of making a kind of vinegar. They owe their acidity to the presence of malic acid, and an infusion of them has been recommended as a cooling drink in febrile complaints, and a gargle in affections of the throat; but from the observations of Dr. Fahnestock, it appears that the inner bark of the root is possessed of much higher powers; he states that an infusion of it is almost a specific in the sore mouth resulting from mercurial salivation.

The *R. copallinum* was at one time supposed to afford one of the resins known under the name of Copal, but this idea is erroneous as far as regards the species as existing in the United States, for although it certainly exudes a resinous juice, this is in very small quantity, nor does it harden like the true copal; in Mexico, where it is said to be procured, the case may be different, as it is well known that the same plant may furnish a large quantity of resinous juice in one climate and be almost destitute of it in another; thus the Liquidambar abounds in the balsam of that name in Louisiana, but is very deficient in it in Maryland and Pennsylvania.

The leaves and berries of these species are much used by the Indians to mix with, and as a substitute for tobacco for smoking.

The *R. metopium*, a West India species, furnishes a gum known as "Doctor's gum," which, in large doses, is emeto-cathartic, and is said in smaller ones, to be a useful remedy in disorders of the bowels and respiratory organs. The mode in which it is given is to mix a spoonful of the fresh juice with two ounces of boiling water; the dose is a teaspoonful occasionally. (*Jam. Phys. Jour.*) Descourtilz (*Flor. Med. Antill.* ii. 49) states that the bark is an excellent astringent. The *R. coriaria* is also a powerful astringent, and is used in tanning leather; its acid fruits are employed in Turkey to form vinegar. The *R. cotinus* furnishes most of the Sumach of commerce, and its wood is the basis of a bright-yellow dye.

Pistacia.—*Linn.*

Flowers diœcious, apetalous. *Males*, calyx 5-cleft; stamens five; anthers almost sessile. *Females*, calyx 3–4-cleft; styles three. Drupe 1-seeded.

This genus contains about a dozen species, all of which are trees or shrubs, affording a resinous juice, and having alternate, winged, or trifoliate leaves. They are principally natives of countries bordering on the Mediterranean, where some of them are cultivated for the sake of the nut, which is edible, and affords a bland oil.

1. P. lentiscus, *Linn.*—Leaves abruptly pinnate; leaflets ovate lanceolate. Petiole winged. Flowers racemose. Segments of the calyx ovate, shorter than the stamens.

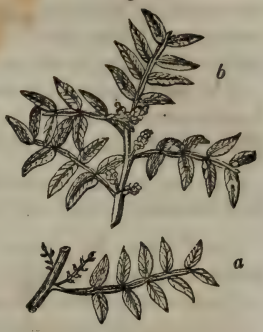
Linn., *Sp. Pl.* 1455; Woodville, *Med. Bot.*, t. 412; Stephenson and Churchill, *Med. Bot.*, iii. 130.

Common Name.—Mastic tree.

Foreign Names.—Lentisque, *Fr.*; Lentisco, *It.*; Mastixbaum, *Ger.*

Description.—The Mastic tree, or rather shrub, seldom is more than about twelve feet in height, and eight or ten inches in diameter. It is covered with a smooth, brown bark, and, towards the top, sends off numerous branches. The leaves are abruptly pinnate, consisting of five or six opposite, narrow, ovate leaflets, which are dark green above, and pale beneath; they are smooth, acuminate at each end, and terminated by a small curved spine; they are sessile. The common petiole is winged. The flowers are in single axillary racemes, and very small. In the males, the calyx is divided into five minute, ovate segments, the stamens five in number, very short, and the anthers large, brown, and quadrangular. The females are placed alternately on the peduncle, and their calyx consists of three small scale-like segments. The ovary is ovate, and supports three styles, with reflexed, clavate stigmas. The fruit is a drupe, which is obovate, smooth, and reddish; it contains a smooth nut.

Fig. 99.



P. lentiscus.

It is a native of the south of Europe and the Levant. It flowers in April and May, and presents several varieties; but is distinguished from all the other species of the genus in having no odd leaflet. It is principally cultivated for its resinous juice, which is well known under the name of Mastic. The greater proportion of this resin is derived from the island of Scio, where its extraction and preparation form an important branch of industry. It is obtained by making transverse incisions in the bark in August; from these the juice exudes in drops, and gradually concretes, and is collected for use. Under the Turkish laws, it was forbidden to make any attempt to collect Mastic before the 27th of August. This harvest lasts for eight days, and furnishes the best article; fresh incisions are made in the trees until the 25th of September, after which no more were allowed to be performed; but the product was permitted to be collected until some time in November, when a total stop was put to the business. The finest quality was sent to Constantinople, the second principally to Egypt, whilst a portion of this, and the third quality, were disposed of to the merchants. What the regulations are since the change of government, we are ignorant of.

This tree is also raised in various parts of southern Europe, but does not afford a sufficient quantity of resin to render its extraction profitable. The kernels of the nut are eatable, and furnish an oil which is used for burning in Spain and the Levant. The wood is hard and yellowish, and is sometimes used in the arts.

Mastic, as found in the shops, is in yellowish, semi-transparent, brittle grains or tears, with a mild, agreeable smell, and a resinous but not unpleasant taste. When chewed, it becomes soft and tough, but afterwards white, opaque, and hard. It is much used among the Turks as a masticatory, to sweeten the breath and strengthen the gums. It is also said by travellers, that they esteem it so highly as even to mix it in their bread, and in fact to use it in every possible way. The principal consumption of it in this country, is as a varnish, for which purpose it is dissolved in spirits of turpentine or alcohol. Mastic is composed of a small portion of volatile oil, and of two resins; one, consisting of about three-fourths of the whole, soluble in alcohol,

and the other, which has received the name of Masticine, not acted upon by that fluid, and somewhat resembling caoutchouc in its properties.

Medical Properties, &c.—Mastic is rarely employed in medicine. It was at one time in some repute as an astringent and diuretic, in chronic catarrhs, dysentery, mucous discharges, and cutaneous disorders, given in the form of an emulsion, but is now seldom or ever prescribed. Dentists use it for the purpose of filling the cavities of carious teeth; but it may be considered as rather belonging to the domain of the industrial arts than to medicine.

The wood has also been employed, and is recognised by some of the foreign pharmacopœias. It is well spoken of by some German writers, in gout and in some affections of the stomach.

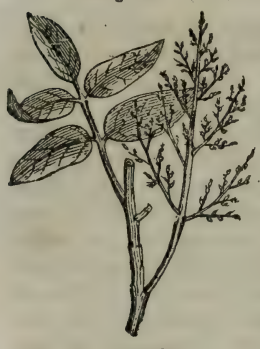
2. P. TEREBINTHUS, *Linn.*—Leaves pinnate, with an odd leaflet; leaflets about seven, ovate-lanceolate, rounded at base. Segments of calyx subulate.

Linn., *Sp. Pl.*, 1455; Woodville, t. 153; Stokes, *Med. Bot.*, iv. 531; Stephenson and Churchill, iii. 129.

Common Names.—Turpentine tree, Turpentine Pistacia.

Foreign Names.—Pistachier sauvage, *Fr.;* Terebinto, *It.;* Terpantinbaum, *Ger.*

Fig. 100.



P. terebinthus.

Description.—A small tree, seldom more than thirty feet high. The trunk and branches are covered with a dark gray or blackish bark. The leaves are pinnate, and consist of three pairs of ovate-oblong, entire, smooth leaflets, with an odd one, all of a dark-green colour, when old, but reddish in their young state. The flowers are in large, compound racemes. The males have a 5-cleft calyx. The stamens are five in number, very short, with large, brown anthers. The females have a trifid calyx, and a roundish, somewhat triangular ovary, supporting three styles, with obovate, clavate stigmas. The fruit is about the size of a large pea, ovate, smooth, somewhat compressed, and of a reddish or purplish colour.

It is a native of the south of Europe, Syria, and the north of Africa, flowering in May and June. It is cultivated for the resinous juice it affords, known under the name of Cyprus or Chian Turpentine. This is procured by making incisions in the tree, from July to October, leaving a space of about three inches between the wounds; from these the turpentine exudes, and runs down on flat stones placed beneath, where it hardens during the night. To purify it, it is again liquefied and strained. The product of each tree is very small, the largest not yielding more than about two pounds and a half. This article is about the consistence of honey; it is very tenacious, clear, and almost transparent, of a whitish-yellow colour, and a fragrant smell; its taste is mild and free from any acrimony or bitterness; it has an agreeable terebinthinate odour, combined with that of citron. The nuts are edible, and are much used as an article of food, more especially in Persia.

Medical Properties, &c.—The medical properties of this turpentine are the same as those other substances bearing the same name; and, as it is very scarce, and always commands a high price, it is seldom employed.

Several other species of *Pistacia* are useful; thus the *P. vera* affords the Pistachio nuts so much used, in the south of Europe and Turkey, in the preparation of certain kinds of confectionary, sorbets, &c. The *P. oleosa*, a native of Cochin-China, also furnishes nuts from which an oil is made, which

is much used by the natives; and the fruit of the *P. atlantica*, found in Africa, is in general request among the Arabs as an article of food.

Order 31.—RUTACEÆ.—*De Candolle.*

Calyx in 4–5 divisions. Petals sometimes wanting, or as many as divisions of the calyx, or combined into a monopetalous corolla; æstivation usually twisted, sometimes a little valvular. Stamens equal in number to the petals, or twice or thrice as many, or fewer by abortion, hypogynous, on the outside of a disk surrounding the ovary, and free or combined with the base of the corolla. Ovary sessile or stipulate, its lobes equal in number to the petals, or fewer; style single, sometimes divided at base into as many parts as there are lobes; stigma simple or dilated. Fruit of several capsules, either firmly united or more or less distinct. Seeds 2 or solitary, with a testaceous integument; embryo with or without albumen; cotyledons variable.

The Rutaceæ are trees, shrubs, or rarely herbs, with exstipulate, opposite or alternate simple or pinnate leaves, covered with pellucid, resinous dots. They are found in most parts of the world, but are most common in Australia, South America, and Southern Africa.

They are characterized by great bitterness, and furnish many articles of much importance as remedial agents. Besides those to be noticed particularly, the following have been employed in medicine. *Dictamnus albus* was at one time in much repute in the treatment of fevers, the nervous affections, scrofula, &c. Störck speaks of it in the highest terms as a stomachic and febrifuge. It was also employed as an anthelmintic. It abounds so much in volatile oil, that in warm evenings the emanations from it can be set on fire. The barks of several of the South American Rutaceæ are known under the name of *Quina*, and are used as substitutes for cinchona. Among these is that of the *Esenbeckia febrifuga*, employed in Brazil and thought as powerful as cinchona. Another bark of the same country is that of the *Ticorea febrifuga*, which is said by St. Hilaire (*Pl. usuel. Bras.*, lib. 4), to be a very active antiperiodic. The same writer also says that the *Hortia brasiliensis* is employed for the same purpose, but is not as powerful.

Ruta.—*Linn.*

Sepals 3–5 persistent. Petals equal in number to sepals, unguiculate. Stamens twice as many as petals, with an equal number of glands at base. Pericarp somewhat globose lobed.

The genus Ruta contains several herbaceous and somewhat shrubby species, which are very closely allied to each other, and probably are possessed of the same physical qualities. None of them are natives of the American continent.

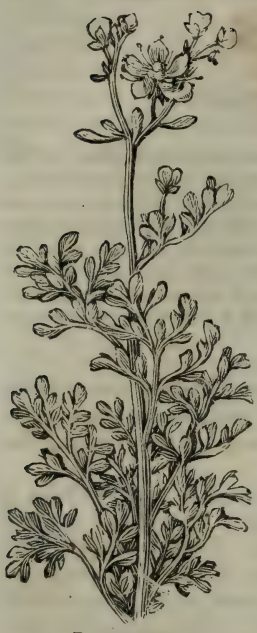
R. graveolens, *Linn.*—Leaves supra-decompound; leaflets oblong, the terminal one obovate. Petals entire, or a little toothed.

Linn., *Sp. Pl.* 523; Woodville ii. 483; Stephenson and Churchill, ii. 71; Rafinesque, *Med. Flor.* ii. 75.

Common Names.—Rue; Common Rue.

Foreign Names.—Rue, *Fr.;* Ruta, *It.;* Raute, *Ger.*

Fig. 101.



R. graveolens.

Description.—Root perennial. Stem bushy, two or three feet high, much branched, woody at the lower part, covered with a rough, gray bark, the upper part and branches smooth and of a yellowish-green colour. The leaves are alternate, smooth, glaucous, a little tomentose and dotted, and doubly pinnated; the leaflets are sessile, unequal and oblong, the terminal one larger and obovate. The flowers are of a pale greenish-yellow colour, in terminal corymbose panicles, the terminal, or first unfolded, only having the full number of the parts of fructification; the others having eight stamens and four sepals and petals. The petals are large, rounded a little, toothed at the extremity, and concave, attached by narrow claws. The stamens are equal and bear small yellow anthers. The ovary is oval, with crucial furrows, and is surmounted by a short style. The capsule is gibbous, 4-lobed, and bursts at the summit of each lobe, for the passage of numerous, angular, blackish seeds. The process of impregnation is curious, each anther in turn approaching the style, and after shedding its pollen, retiring.

Rue is a hardy evergreen under-shrub, a native of the south of Europe and north of Africa. It is cultivated in our gardens and has even become naturalized in some parts of the United States. It flowers during the whole summer, and is well known by its strong, peculiar, and even fœtid smell. It was well known to the ancients, and is frequently noticed in the writings of Hippocrates and Galen, by whom it was lauded as an alterative and alexiteric; it formed one of the ingredients of the famous antidote of Mithridates against poisons. Pliny states that it was eaten by painters and engravers to benefit their eyesight, and notwithstanding its nauseous taste and smell it is still used in salads in Germany; whilst in Italy, we are told by Bodard, it is prized by the Roman ladies to counteract the perfume of flowers, which they dread. At one time it was used in Roman Catholic churches, to sprinkle the holy water, and hence was called *Herbe de Grace.*

Medical Properties, &c.—Rue is an active stimulant, even acting on the skin like an acrid, but much more so on some persons than others. Its powers are owing to the presence of an oil principally contained in the leaves. It is but little employed by regular practitioners, but is in much repute among empirics and in domestic practice as an antispasmodic and emmenagogue. It is a very powerful remedy, and deserves more attention from the profession than is now awarded to it. It has proved highly useful in flatulent colic and in some nervous complaints, as hysteria, and even in epilepsy. As a vermifuge, also, it has displayed no inconsiderable powers, and as an emmenagogue it has unfortunately been too well known, the records of our criminal courts showing that no article is so commonly resorted to to procure abortion as the oil of Rue; in some cases at the expense of the life of the mother. Where it has been employed as an abortive, the oil has, in almost every case, been the preparation employed. This powerful article in overdoses acts like an acro-narcotic, and should never be administered in any case without extreme caution.

From an analysis of this plant by Mähl, it is shown to contain volatile oil, bitter extractive, a peculiar vegeto-animal matter, malic acid, and other substances common to vegetable substances. It owes its activity to the volatile oil; this is of a yellowish-green colour, of a sp. gr. of 0·837, has a bitter acrid

taste, is somewhat soluble in water, and is not acted upon by hydrochloric acid.

There are several other species of Rue, closely resembling the *R. graveolens*, and which are often cultivated instead of it, the *R. chalapensis* is only distinguishable by its ciliate petals, and the *R. sylvestris* is principally recognised by the follicles being narrower; both these species are identical with the officinal one in properties, and may without inconvenience be substituted for it. It is stated by Forskäl that the *R. tuberculata* is used by the Arabs to increase the growth of hair on the head and chin.

Barosma.—*Willdenow.*

Sepals 5, united at base, dotted. Disk at base of calyx with a small rim. Petals 5, unguiculate. Stamens 10, five opposite the petals sterile, petaloid, sessile; the other five longer, subulate; anthers with a gland at apex. Capsules 5, glandular.

This genus is formed of species formerly belonging to *Diosma*, and might without impropriety have been retained as a division of it, as the differences are scarcely sufficient to authorize their separation. It is composed of small shrubs, all natives of Southern Africa, where their leaves are used by the Hottentots in the form of powder to sprinkle on their bodies; they term this powder Bookoo or Buchu. Although all the species possess similar physical properties, only one of them has been recognised as officinal.

B. crenata, *Linn.*—Leaves ovate, lanceolate, or obovate, dotted, crenate. Flowers solitary, terminal.

Linn., *Sp. Pl.* 287; Loddiges, *Bot. Col.* n. 404; Stephenson and Churchill, ii. 121; Lindley, *Fl. Med.* 213.

Common Names.—Buchu; Diosma.

Description.—The plant is perennial, erect, smooth and about two feet in height; the branches are round or somewhat terete and of a purplish colour. The leaves are opposite, scattered, ovate, acute, of a dark-green colour above, paler beneath, crenated and beset with small transparent punctures, which are most marked near the crenations. The flowers are whitish, or of a pale-reddish colour, solitary on short pedicels at the ends of short lateral shoots. The calyx has five ovate, acute, persistent sepals, and the corolla an equal number of elliptic, oblong, bluntish petals, which are somewhat spreading. At the base of the corolla is a disk or nectary furnished with petaloid processes. The stamens are five, subulate, bearing ovate, incumbent, anthers. The ovary is superior, turbinate, supporting an erect style crowned with a simple stigma. The capsule is ovate, containing a single, oblong black shining seed, with an elastic testa.

Fig. 102.

B. crenata.

1. Calyx. 2. Styles and stigma. 3. Fruit. 4. Seeds. 5. Dots on leaf.

Like the rest of the species it is a native of Southern Africa, where it was

known to the natives both as a perfume and a sudorific medicine. The Hottentots, from whom the Dutch derived their knowledge of the plant, also distil the leaves with wine, making what they term Buchu brandy; this they consider as a sovereign remedy in all complaints of the stomach, bowels, and bladder. Burchell and other travellers state that they likewise apply a decoction of the leaves to wounds. It was not, however, until 1821 that it attracted the attention of the medical profession, when Dr. Reece published some papers on the subject, which induced a trial of its powers by other practitioners, who having given a favourable account of it, it became generally used and was recognised as officinal.

Medical Properties, &c.—The Buchu is an aromatic stimulant and tonic. When administered in moderate doses, it excites the appetite and acts as a carminative and anti-emetic, and promotes the secretory functions of the bladder and skin, especially the first, as it appears to have a direct influence on the urinary organs. It was in diseases of this apparatus that it was first used by the profession, and is still mainly employed, though there is evidence of its good effects in chronic rheumatism, and in irritative affections of the rectum. The cases in which the most decided benefit have arisen from its employment, are chronic inflammations of the bladder and urethra, attended with an excessive secretion of mucus; in such a state of things which are often the result of a mismanaged gonorrhœa, or of retention of urine, diseased prostate gland, &c., the buchu has proved highly beneficial, by diminishing the secretion, and relieving the irritability of the bladder, though in some instances, the very reverse has been the case, the complaint having been rather exasperated than mitigated.

The buchu has been analyzed by several chemists, and shown to contain a volatile oil, resin, bitter extractive and the ordinary constituents of leaves. The volatile oil is lighter than water, and possesses the peculiar odour of the plant. The extractive, which Brandes considers as a peculiar principle, and has termed *Diosmin*, is soluble in water, but not in alcohol or ether. The Buchu is given in powder in doses of a scruple to half a drachm, but the infusion or tincture are generally preferred; the dose of the first of these preparations is from two to four tablespoonfuls; and of the latter from one to four drachms.

As found in commerce, Buchu consists of several species of Barosma, besides that noticed above; at this time most of this drug in the shops in this city, is composed of the leaves of the *B. serratifolia*, which are distinguished by their linear-lanceolate form, and serrulate edges. Those of the *B. crenulata* are also often mixed with these two; they much resemble those of the *B. crenata*, but are oblong-ovate, and have a narrow pellucid margin around the whole leaf. As all the species are possessed of the same properties, they can be used indifferently without inconvenience.

Galipea.—*Aublet.*

Calyx short, 5-toothed. Petals 5, united at base into a short tube, bell-shaped. Stamens 4—7 hypogynous, unequal; 2—5 shorter, sterile. Style 1, bearing a 4—5 grooved stigma. Carpels 5, sometimes by abortion fewer, seeds solitary by abortion.

This genus, which is peculiar to South America, was established by Aublet on specimens found in Guyana, without his indicating it as the source of the Angustura bark, as that article was supposed to be derived from Africa. Hence, when Humboldt and Bonpland visited Angustura, and found that the bark was there termed Cusparé by the natives, and that the tree producing it appeared to belong to an undescribed genus, they established one for its re-

ception under the name of *Cusparia;* a specimen in the mean time having been sent to Willdenow, who considered it to be new, he bestowed upon it the name of *Bonplandia*, in honour of one of the travellers, and his name was afterwards adopted by them in preference to that proposed by themselves. This has created much confusion, for not only has it been shown that the Angustura bark is derived from one or more species of the Galipea of Aublet, but also that another genus had been previously established by Cavanilles under the name of Bonplandia. This genus has also received many other names; thus it is the *Angostura* of Rœmer and Schultz, the *Conchocarpus* of Milcan, and the *Obentonia* of Velloz.

There has been equal confusion as regards the species; the officinal bark at one time being considered as the product of the *G. cusparia* (*Bonplandia trifoliata*) on the authority of Humboldt and Bonpland, and recognised under this name in the various pharmacopœias; but the observations of Dr. Hancock have conclusively shown that although this species may afford an Angustura bark, that the article known in commerce is derived from another species, to which he has affixed the name of *officinalis*, which appellation has been adopted in the U. S. Pharmacopœia.

1. G. OFFICINALIS, *Hancock.*—Leaves trifoliate. Racemes stalked, axillary terminal. Fertile stamens 2, sterile 5; anthers without appendages.

Hancock, *Trans. Med. Bot. Soc.* 1829, 25; Lindley, *Fl. Med.* 211.

Description.—A small tree not more than twelve to twenty feet in height, and about three to five inches in diameter. The leaves are alternate and petiolate, and consist of three oblong leaflets, pointed at both extremities, on short footstalks, of a bright green colour, and when fresh exhaling a narcotic odour resembling that of tobacco; common petiole as long as the leaflets. The flowers are white, hairy, numerous, and arranged in terminal and axillary racemes, or with long peduncles; they, like the leaves, have an unpleasant smell. The calyx is somewhat campanulate, 5-cleft, inferior; the corolla is about an inch in length, composed of five unequal, oblong, obtuse petals, united at the base into a short tube, and somewhat reflexed above. The fertile stamens are two, and the sterile ones five, and linear. The style is erect, with a simple stigma. The fruit consists of five bivalve capsules, with two black seeds in each, one of which is often abortive, as are sometimes two or more of the capsules.

This small tree is found in great numbers in the district of country bordering on the Orinoco, at a distance of two hundred miles and upwards from the sea, and at an elevation of from six hundred to a thousand feet. It is known by the natives under the name of *Orayuri;* and by the Spanish inhabitants, by that of *Cascarilla*, or *Quina de Carony*. It was first described by Dr. Hancock, and proved to be the source of the Angustura bark, as is shown by the character of the bark found in the shops, which is evidently the product of a shrub or small tree, and not derived from one of the size of the species noticed by Humboldt and Bonpland.

2. G. CUSPARIA, *De Candolle.*—Leaves trifoliate. Sterile stamens three, fertile ones two; anthers with two appendages. Stigma 5-grooved.

St. Hilaire in De Candolle, *Prod.* i. 731; Lindley, *Flor. Med.* 210; *Cusparia febrifuga*, Humb. & Bonp., *Bonplandia trifoliata;* Willd. *Act. Berol.*, 1802; *Angostura cusparia*, Rœm. & Schultz, iv. 188.

Description.—A lofty evergreen tree, rising to the height of 60 to 80 feet, with gray bark, and much branched towards the summit. The wood is of a bright-yellow, not unlike the box in appearance and hardness. The branches are alternate, and the upper ones nearly horizontal. The leaves, which have an agreeable odour when fresh, are alternate, about two feet long, independent of the petiole, and composed of three oblong ovate folioles, acuminate at each end, attached to a common petiole of about a foot long. The flowers are in a terminal raceme, composed of alternate peduncles, each from two to six-

flowered. The calyx is inferior, persistent, and tomentose. The corolla is funnel-shaped, tubular below and divided into five petals above. The stamens are shorter than the corolla, and consist of two fertile and three sterile ones. The germen is superior, and composed of five ovate, hairy ovaries, with a single style and an oblong, 5-grooved stigma. The fruit consists of five oval, bivalve capsules, each containing a single seed.

This species has been discovered in many parts of South America, but chiefly in Cumana. It was considered by Humboldt and Bonpland to furnish the true Angustura bark of commerce, but as has before been stated, this opinion has been disproved by Dr. Hancock, but it is highly probable that all the species of Galipea have very analogous properties, and might be employed indiscriminately without inconvenience.

Angustura bark was first carried to Europe about 1778, and was then thought to be an African product, but it was soon ascertained that it came from Angustura, in South America, and hence this name was bestowed upon it; but it was not known from what tree it was derived, many writers supposing that it was the product of a *Magnolia*, whilst others, among whom was M. Guibourt, attributed it to the *Rouhamon*, Aublet, both widely differing in natural characters from the true plant. At present, although there may be some uncertainty as to the officinal species, there is none as regards the genus, though there is much discrepancy in the nomenclature of different Pharmacopœias; thus the London terms it *Galipea cusparia*, on the authority of De Candolle, the Edinburgh and Dublin, *Bonplandia trifoliata*, following Humboldt and Bonpland, whilst the United States has adopted the opinion of Hancock, and terms it *Galipea officinalis*.

As found in commerce, this bark is in pieces of various lengths and sizes, sometimes flat or somewhat rolled, or more rarely quilled. Externally, it is of a light-gray colour, and is covered with lichens, the epidermis sometimes is soft and spongy, and thick, or it may be wholly wanting; internally the colour is of a yellowish-brown. It breaks with a compact, resinous fracture; the odour is disagreeable, and the taste bitter, and somewhat aromatic, leaving a sensation of pungency. In consequence of a poisonous bark having been mixed with some parcels of Angustura offered for sale in Europe some years since, and fatal results having attended its administration, much attention was excited to the subject and numerous experiments were instituted to verify the two substances. The false bark is always heavier and more compact than the true, is destitute of lichens on the epidermis, and is either coated with a rust-coloured dust, or is of a yellowish-gray colour with numerous whitish elevations. One of the best modes of distinguishing the two barks is by the action of nitric acid upon them, this agent producing a dull, red colour on either surface of the true bark to which it is applied, whereas it induces an emerald-green when dropped on the epidermis of the false, and a blood-red tint on the internal surface. This false bark was, at one time, supposed to be the product of the *Brucea ferruginea*, a native of Abyssinia, but this was abandoned when it was shown that it was brought from South America and not from Africa; for the same reason, the idea that it was derived from the *Strychnos colubrina*, a plant of the East Indies, was also given up. It is now supposed to have been obtained from some unknown species of *Strychnos*, though some writers have contended that it is yielded by a *Solanum*.

Angustura bark is a stimulating tonic, which, when given in large doses, acts on the stomach and bowels; at one time it was considered of equal if not superior efficacy to Cinchona in the cure of paroxysmal diseases, and was also esteemed of great benefit in chronic diarrhœa, obstinate dysentery, and a debilitated condition of the stomach and bowels. A more extended trial of its powers, has shown that it is vastly inferior to the Peruvian bark in the removal of intermittent fever, and not superior to many others of the vegetable

tonics in the treatment of complaints in which such remedies are required. Its use is therefore limited to cases of debility of the digestive organs, for which it is well adapted, as it does not oppress the stomach. At the same time it should be stated that Dr. Hancock speaks in the highest terms of its efficacy in malignant fever, dysentery and dropsy, occurring in its native country, considering it far superior to Cinchona. His success with it may have arisen from the bark being more powerful in a fresh state, or from the form in which he administered it; this was in a fermented infusion given very freely.

Several analyses have been made of this article, by which it is shown to contain, in addition to the usual vegetable constituents, a volatile oil, which is the odorous ingredient; a peculiar bitter principle, *Cusparin* of Saladin: this is neutral, crystallizable, soluble in alcohol, slightly so in water, and insoluble in ether or the volatile oils; two resins, one hard, brown and bitter, and the other soft, greenish-yellow and balsamic. Angustura is given in powder, in doses of from ten grains to half a drachm, or preferably in infusion or tincture.

There are several other species of *Galipea* noticed by Aublet in his Plants of Guyana, and Dr. Hancock states one of the species of *Raputra*, of the same author, properly appertains to this genus. It is likely that the whole of them possess analogous properties, as the order to which they belong is an extremely natural one.

Order 32.—XANTHOXYLACEÆ.—*Lindley.*

Flowers regular, dicœcious, or polygamous by abortion. Sepals 3—5, rarely 6—9, connected at base. Petals as many as sepals, sometimes wanting; æstivation twisted. Stamens as many as, and sometimes twice as many as petals, distinct. Ovaries usually as many as sepals, either distinct or united, ovules 2—4 in each carpel; styles distinct or connate when the ovaries are separate, and combined when these are united. Fruit baccate or membranaceous, of 1—5 drupes or 2-valved capsules. Seeds solitary or in pairs, pendulous, with oval, flat cotyledons, and the embryo within a fleshy albumen.

This order, which will probably require revision, consists of trees and shrubs, which are furnished with alternate or opposite, simple or pinnate, exstipulate leaves, mostly marked with pellucid dots. They are generally aromatic and bitter; and the properties of the several species are very similar, being stimulant and tonic.

Xanthoxylon.—*Kunth.*

Dicœcious. Sepals 3—9, small. Petals sometimes wanting. Stamens as many as the sepals. Ovaries 1—5 on a central disk, with two suspended ovules. Carpels 2-valved, 1—2-seeded.

This genus, whose name is variously spelt by botanists, *Zanthoxylum*, *Xanthoxylum*, and *Xanthoxylon*, the latter of which is most correct, is composed of trees and shrubs, which are usually prickly on the branches, petioles, and midribs of the leaves. The species, with a few exceptions, are peculiar to America, and principally to the tropical regions, two or three only being natives of the United States. The species vary much in their reproductive organs, and several genera and sub-genera have from time to time been founded on these differences, but have not been generally adopted by botanists. All the species have an aromatic and pungent bark, and might in all probability be indifferently used in medicine; only one, however, is recognised as officinal in our national pharmacopœia.

X. fraxineum, *Willdenow.*—Prickly. Sepals 5 or more, petaloid. Petals none. Umbels lateral. Leaves pinnate; leaflets ovate, oblong, nearly sessile. Carpels stipitate.

Willdenow, *Sp. Pl.* iv. 757; Torrey & Gray, *Fl.* i. 214; Bigelow, *Med. Bot.*, iii. 156; Rafinesque, *Med. Fl.*, ii. 113; Lindley, *Fl. Med.*, 216.

Common Names.—Prickly Ash, Toothache-bush, Yellow-wood, &c.

Foreign Names.—Frene epineux, *Fr.*; Radice Lopeziana, *It.*

Fig. 103.

X. fraxineum.

Description.—A shrub of from five to ten feet in height, with alternate branches, having strong, sharp, scattered prickles. The leaves are alternate, pinnate; leaflets in four to five pairs, and a single terminal one, nearly sessile, ovate-oblong, with slight glandular serratures, somewhat pubescent beneath; the common petiole is round, usually prickly, but sometimes unarmed. The flowers are in small sessile umbels, near the origin of the young shoots; they are small and greenish, with a somewhat aromatic smell. They are usually diœcious, but sometimes polygamous; where they are perfect, the calyx is 5-parted, with large erect segments. The stamens vary in number; in the perfect flowers there are 5, whilst in the male flowers they are from 3—5. In the perfect flowers the styles are from 3—4, and in the female 5. The capsules are stipitate, elliptical, punctate, of a reddish-green colour, 2-valved, and containing one oval blackish seed.

The Prickly ash is found in most parts of the United States, growing in woods and thickets. The flowers appear in April and May, before the foliage. Some discrepancy of opinion has existed among botanists with regard to this species. It was first described by Miller, under the name of *americanum*, in 1781; then by Marshall, as *fraxinifolium*, in 1785, which name was changed by Willdenow in 1796 to *fraxineum*, by which specific appellation it has been generally recognised. It is also the *ramiflorum* of Michaux, and the *tricarpum* of Hooker. There is no doubt that it should bear the name bestowed upon it by Miller, and which is adopted by Torrey and Gray; but we have deemed it best to retain that by which it is most generally known, and which is recognised in the Pharmacopœia. It may also be noticed that the *Aralia spinosa* is very often called by the name of Prickly Ash; this, although possessing some of the qualities of the Xanthoxylon, is by no means identical with it as a remedial agent.

The whole plant is endowed with active qualities; the leaves and fruit abound in a volatile oil, which is extremely fragrant; and the bark is acrid, pungent, and aromatic; this latter is the officinal portion. As found in the shops it is in quilled fragments, of a grayish-white colour externally, and somewhat shining within. Where it has been derived from the small branches it is beset with prickles. It is light, brittle, has a somewhat starchy fracture, and when dry possesses very little smell. The taste is at first somewhat sweet and aromatic, but soon becomes bitter and very acrid.

Medical Properties, &c.—This article is somewhat allied to Mezereum in

its properties, as it is an active stimulant, causing more or less general excitement, with a tendency to perspiration. It has been much used in domestic practice in the treatment of chronic rheumatism, and with much success; it is also employed in the relief of flatulence and colic, and externally as a topical stimulant to ulcers. From its great acridity it has been employed as a sialagogue in toothache, and like other powerful irritants, oftentimes with much success.

It is administered in powder in doses of from ten to twenty grains, but the most common form is in decoction, made by boiling an ounce in three pints of water down to a quart, of which one-half is to be taken in divided doses in twenty-four hours.

It has been analyzed by Dr. Staples, who found it to consist of a volatile oil, a greenish fixed oil, resin, gum, a colouring matter, and a peculiar crystallizable principle, which he calls *Xanthoxyline*. This substance appears to be identical with that discovered by Chevallier and Pelletan in the bark of another species (the *X. clava-Herculis*), and which they have termed *Zanthopicrite;* both these are closely allied to Piperine, and both, like that substance, probably owe their sensible properties to the presence of volatile oil.

The other native species, *X. carolinianum*, is identical in its properties with the above, but is more powerfully acrid. In the West Indies, the *X. clava-Herculis*, or Yellow-wood, is held in high esteem, and is said to cause a profuse salivation if its internal use be persevered in for any length of time; and a Brazilian species, the *X. hiemale*, is stated by A. St. Hilaire, to be used by the natives as a topical application for the relief of ear-ache. *X. caribæum* is said to be febrifuge; and in China, the root of *X. nitidum* is considered as sudorific, febrifugal, and emmenagogue. The *X. piperitum* and *avicennæ* are thought in China and Japan to be antidotes to all poisons. The seeds of *X. budrunga* smell like lemon-peel, and the unripe capsules of *X. rhetsa* taste like that of the orange. The *X. alatum* is used in Nepal by the natives as an aromatic stimulant.

Ptelea.—*Linn.*

Flowers unisexual. Calyx 4—5-parted, short. Petals 4—5, spreading, longer than the calyx. *Male:* stamens 4—5, longer than the petals, inserted round a receptacle bearing a sterile pistil. *Female:* stamens 4—5, short, abortive. Ovary on a convex receptacle, compressed, 2-celled. Fruit compressed, membranous, indehiscent, swelled in the middle, surrounded by a circular wing.

A small genus of shrubs peculiar to America and India. The native species, *P. trifoliata*, is said by Schœpf (*Mat. Med. Am.*) to be anthelmintic, for which purpose the leaves and young shoots are used in a strong infusion. The fruit is aromatic and bitter, and is stated to be a good substitute for hops.

Order 33.—SIMARUBACEÆ.—*Richard.*

Flowers hermaphrodite or unisexual. Calyx 4—5 sepaled, persistent. Corolla with 4—5 petals, hypogynous, deciduous, æstivation twisted. Stamens equal or double in number to the petals, placed on a hypogynous disk. Ovary four to five-lobed, containing one suspended ovule in each cell; style single, filiform, larger at base. Carpels as many as petals, capsular, bivalved, opening inwardly, monospermous. Seeds pendulous, exalbuminous, with two thick cotyledons, and a short superior radicle.

This order formerly constituted a division of the Rutaceæ, but was separated by Richard, and has been adopted by most modern botanists. It is com-

posed of trees and shrubs, having alternate, pinnate, exstipulate leaves, and a very bitter bark. They are principally peculiar to the tropical regions of America.

SIMARUBA.—*Aublet.*

Flowers unisexual. Sepals 5. Petals 5, longer than sepals, spreading. Male: stamens almost as long as petals, arising around a receptacle having five small lobes at its apex. Female: five ovaries, surrounded by 10 hairy scales. Style one, divided at base into five, united at top, and bearing a five-lobed stigma. Fruit baccate.

This genus was first established by Aublet, but was not admitted by botanists for some time; the species being included in Quassia; it was again separated by Richard, and made the type of a natural order. In this he has been followed by most recent writers. The species are all large trees, with evergreen foliage.

S. AMARA, *Aublet.*—Male flowers decandrous. Stigma 5-partite. Leaves abruptly pinnate; leaflets alternate, almost sessile, pubescent beneath.

Aublet, *Guain.* ii. 859; Lindley, *Fl. Med.* 207; *Quassia simaruba*, Woodville, ii. 76; Wright, *Trans. Roy. Soc. Edin.*, ii. 73; Stephenson and Churchill, iii. 171.

Common Names.—Simarouba; Simarouba Quassia; Mountain Damson.

Foreign Names.—Simarouba de Cayenne, *Fr.*; Simaruba, *It.*; Simaruba Quassia, *Ger.*

Fig. 104.

S. amara.

1. Female flower. 2. Drupes. 3. Male flower. 4. Stamen.

Description.—A tall tree with long roots, and a thick stem with a blackish and furrowed bark and sending off alternate spreading branches, whose bark is smooth and gray, marked with yellow spots. The wood is hard, white, and has scarcely any bitter taste. The leaves are pinnate and are alternate; the leaflets are also alternate, from two to nine on each side, about two inches long, obovate, entire, somewhat coriaceous, of a dark green above and whitish beneath. The flowers are of a yellowish-white colour, monœcious, and collected in branched spikes or long axillary panicles. (Dr. Wright states that in Jamaica the tree is dicecious.) The calyx is small, and divided into five obtuse, erect segments. The petals are lanceolate, equal, spreading, somewhat reflexed, and much longer than the calyx. The stamens are ten, equal, about as long as the corolla, bearing oblong, incumbent anthers, with a small hairy scale at base. The ovary is ovate, five-parted, crowned with an erect, cylindrical style, bearing a five-lobed stigma, and surrounded at base with a ring of hairy scales. The fruit consists of five ovate, black, smooth, one-celled berries, all connected with a fleshy, pentagonal receptacle, and opening by a fissure when mature, each containing a single oblong seed.

This tree is a native of Jamaica and several parts of South America. It is known in Jamaica by the names of Mountain Damson, and Stavewood. Although generally considered by botanists to appertain to Decandria Mono-

gynia, of the sexual system, it evidently is pentagynous; for although the styles are connected above, they are distinct below, are crowned with five connected stigmas, and spring from a quinque-lobate germ. It flowers in November and December, and prefers a sandy, arid soil. The bark was long known and used in Europe before it was ascertained from what plant it was procured. It was first sent from Guyana to Paris under the name of Simarouba, as an almost infallible remedy in dysentery. The first to ascertain its origin, was Aublet, but his account was overlooked until the publication of a paper by Dr. Wright, in the Transactions of the Royal Society of Edinburgh, in which he gave a full account of it under the name of *Quassia simaruba*, since which it has been described by many botanists, but unfortunately under various names; thus it is the *simaruba Guyanensis* of Richard, the *S. officinalis* of De Candolle, and the *Quassia simaruba* of Linnæus, but the appellation bestowed upon it by Aublet, having priority, must be adopted. The wood is used in Jamaica for a variety of purposes, but according to Father Labat it is not fit for culinary purposes, as it imparts a bitter taste to the food. It may here be noticed that Merat and De Lens, in their Dictionary of Materia Medica, commit a great error in stating that this tree is a native of Louisiana and Carolina, and is there used for cabinet work, shingles, &c., but it has not been found within the limits of the United States.

The Simaruba bark of commerce is in long pieces of various sizes, which are much rolled or quilled. They are very fibrous, tough, light, of a grayish colour externally, and of a yellow internally; the surface is scaly, warty, and marked with prominent ridges. They are inodorous, but excessively bitter. This bark is obtained from the root only, that of the trunk and branches being far inferior in its physical qualities.

From an analysis of it by Morin, it was found to contain Quassin, a bitter resin, a volatile oil, several salts, malic, and traces of gallic acid, a little iron, and the usual vegetable constituents. Pfaff states that it also contains a large quantity of mucilage. Simaruba in small doses is a simple bitter tonic and is extremely analogous to Quassia, but when administered freely it occasions vomiting and purging, followed by copious perspiration and increase of the urinary discharge. It was first introduced into practice as a valuable remedy in dysentery; during an epidemic of which in France, during 1718 to 1723, it was highly beneficial, and was found to be successful when all other remedies proved ineffectual. In consequence of this, it was very generally used throughout Europe, not only for this complaint, but for every derangement of the digestive organs, as well as those of the mucous membranes generally, and the highest testimonials of its efficacy have been recorded by the most eminent writers of the day. These writers all agree in stating, that in internal diseases it restores the normal powers of the bowels, allays their spasmodic motions, promotes urine and perspiration, removes the mental depression so constantly attending these complaints, disposes to sleep, relieves tormina and tenesmus, and changes the character of the alvine evacuations. Notwithstanding the high character awarded to it, it is now but little used. This may have arisen from the discredit thrown on it by Cullen, who declares that in his hands it proved inferior to Chamomile in its remedial powers. At present those practitioners who are in the habit of using it, are of opinion that it is appropriate only to those cases of bowel disease where there is no fever; or in other words, in the latter stages. In such a state of things, given in conjunction with laudanum, it has proved highly beneficial. Like Ipecacuanha, it acts most favourably when it creates some nausea. With the other tonics of its class, it may be given in dyspepsia, and where it is wished to restore the strength. It is evident that it is too much neglected at present, and its true powers should be carefully tested. It is given in infusion, made with

two or three drachms of the bark to a pint of boiling water, the dose of which is from one to two ounces when used as a tonic.

A. St. Hilaire discovered another species in Brazil, perfectly identical in its properties with the *S. amara*, and which he has called *S. versicolor*.

Picræna.—*Lindley.*

Flowers polygamous. Sepals 5, very small. Petals 5, longer than the sepals. Stamens 5, longer than the petals. Ovaries 3, on a tumid receptacle. Style trifid. Fruit globose, 1-celled, 2-valved.

The solitary species on which this genus is founded has generally been included in Quassia. The differences were first pointed out by Dr. Wright, who separated it, under the name of *Picrania;* but it had been previously noticed by Brown, and afterwards by Long. These writers call it *Xylopia*, but without assigning sufficient characters to establish its generic rank.

P. excelsa, *Lindley.*—Leaves pinnate; leaflets opposite, petiolated.

Quassia polygama, Lindsay, *Trans. Roy. Soc. Edin.*, iii. 205; *Q. excelsa*, Swartz, *Prod. Ind. Occ.*, ii. 742; Stephenson and Churchill, iii. 173; *P. excelsa*, Lindley, *Flor. Med.* 208; Carson, *Illustrat.*, t. 21.

Common Names.—Lofty Quassia, Bitter-wood, Bitter Ash.

Foreign Names.—Frene amer, *Fr.;* Unchte Quassie, *Ger.*

Fig. 105.

P. excelsa.

1. Male flower. 2. Flower expanded. 3. Fertile flower. 4. Drupe.

Description.—A tall tree, frequently attaining a height of 100 feet, with a straight, tapering stem, often 10 feet in circumference. The branches are given off near the top, and both they and the trunk covered with a smooth, gray or ash-coloured bark; that of the roots is of a yellowish colour, not unlike that of the Simaruba. The wood is of a pale yellow hue, tough, but not very hard, though susceptible of a good polish. The leaves are pinnate, and composed of from 4 to 8 pairs of nearly opposite, elliptical, pointed, entire, smooth leaflets, on short footstalks. The flowers are in corymbose clusters, numerous, small, of a yellowish-green, some male, and the rest hermaphrodite in the same cluster. The calyx is very small, with five equal, ovate, pointed sepals. The corolla consists of 5

equal, lanceolate petals, longer than the sepals. The stamens are 5, somewhat longer than the petals, pubescent, and supporting roundish anthers. The ovary is ovate, surmounted by a slender, grooved style, which is trifid at the apex. The fruit is a small black drupe, usually three, sometimes two, or even only one, attached to the side of a fleshy receptacle.

This fine tree is a native of Jamaica, and some of the other West Indian islands, flowering in October and November, and ripening its fruit in December and January. Much confusion has existed with regard to it, from its having been confounded with the true Quassia. Sloane, in his Plants of Jamaica, describes it under the name of *Quassia excelsa*, but refers to a plate in Plukenet of a different plant. Both Brown and Long, in their respective histories of the same island, notice it under the names of *Xylopicrum* and *Xylopia glabra;* and in Wright's account of the medicinal plants, it is called *Picrania amara*, whilst Swartz styles it *Quassia excelsa.* The first accurate description of it, however, was given by Mr. Lindsay, in the Transactions of the Royal Society of Edinburgh, under the name of *Quassia polygama.* De Candolle includes it in the genus *Simaruba.*

The wood, which is used as a substitute for the genuine Quassia, and bears the same name, is imported from the West Indies in logs of various sizes, covered externally with a smooth, brittle bark. The wood is white, but by age and the action of the air, becomes yellowish; it has no marked odour, but possesses a most intense and permanent bitter taste. In consequence of the scarcity of the true Quassia, this article is almost universally substituted for it in this country, though, if full credit be given to the accounts of the powers of the former, it is far inferior; and Willdenow suggests that this is perhaps the cause why modern practitioners make so little use of it. The principal consumption of this wood is by brewers, to give additional bitterness to malt liquors.

In noticing the qualities of this article, it is difficult to ascertain to which of the two woods, authors refer, both bearing the same name, and apparently possessed of the same physical qualities, though, as just observed, more accurate observations may show that they differ in many important particulars. No complete analysis of it has been made, though it has often been examined. From what has been done, it appears that Quassia contains a bitter principle, which is termed *Quassin*, gummy extractive, a small proportion of volatile oil, some salts, woody fibre, &c. Quassin is a neutral crystallizable principle, very soluble in alcohol, less so in water, and intensely bitter. Its solubility is much augmented by both acids and alkalies.

The medical properties of Quassia are peculiar. In moderate doses it acts like a simple tonic, with no irritating, stimulant or astringent effects; nor have any ill consequences been observed by the generality of practitioners from a long-continued or free use of it; though it is stated, by Barbier and others, that effects have been noticed which would induce a belief that it had some influence on the cerebro-spinal system. These statements receive confirmation, from the fact that it operates as a narcotic poison on the lower animals, as is well known as regards flies; an aqueous solution, properly sweetened, destroying these insects very readily; and the experiments of Buchner and others show that animals of a higher grade, as dogs and rabbits, are destroyed by small quantities of the extract.

Quassia is now principally used as a tonic in dyspepsia, want of appetite, and other functional disorders of the stomach and bowels, and is sometimes given in intermittents and other paroxysmal complaints, but is far inferior to Cinchona and many other febrifuges. At one time it was in high repute in the treatment of malignant fevers, verminose affections, and even gout; but

its reputation was of short duration, whether from the repugnance of patients to take it on account of its extreme bitterness, or from its having been found inefficient, it is difficult to say; though it may have arisen from the circumstance before adverted to, the substitution of an inferior article for the genuine, which may really possess the high qualities attributed to it.

Quassia is seldom given in powder, the general modes of administration being in infusion, tincture, or extract. The first of these preparations has the advantage over most of the other vegetable bitters, that chalybeates can be combined with it without undergoing alteration.

Quassia.—*Linn.*

Flowers hermaphrodite. Sepals 5. Petals 5. Nectaries 5. Stamens 10, bearing transverse anthers. Style slender, not divided at apex.

This genus, which now consists of but one species, though at one time containing the whole of the Simarubaceæ, was instituted by Linnæus, and the name given in honour of a negro of Surinam, named Quassi, who is said to have discovered the virtues of the wood in curing the malignant fevers of that climate, and disclosed the secret to Governor Dalbergh, by whom specimens were sent to Sweden. Linnæus the younger, reunited it to *Simaruba*, and his example has been followed by De Candolle and others.

Q. amara, *Linn.*—Leaves pinnate. Leaflets opposite, sessile. Common petiole jointed, winged. Flowers racemose.

Linn., *Amœn. Acad.* vi. 421; Woodville, ii. 77; Stephenson and Churchill, iii. 172; *Bot. Mag.* xiii. 497; Lindley, *Flor. Med.* 207; Carson, *Illus.* t. 20.

Description.—A small tree or shrub, much branched, and covered with an ash-coloured bark. The leaves are alternate, and consist of two pairs of leaflets, and a terminal one; they are elliptic-lanceolate, entire, very smooth, two or three inches in length, and of a deep green colour. The common footstalk is narrow, but winged on each side with a leafy membrane, which expands towards the base of each pair of leaflets, where also it is jointed or articulated. The flowers are all hermaphrodite, of a brilliant scarlet colour, and are collected in long spikes, which are secund and bracteate. The bracts are lanceolate, reflexed, and of a pink colour. The calyx consists of five small, persistent sepals. The corolla is formed of five lanceolate petals, which are never fully expanded, being twisted in a spiral manner, and opening in an irregular manner. At the base of the corolla is placed the nectary, consisting of five roundish, coloured scales. The stamens are ten, slender, longer than the corolla, and bearing simple anthers, attached by their middle, so as to be transverse. The ovary is ovate, 5-parted, and supports a slender style, longer than the stamens, and terminated by a subulate stigma. The fruit consists of five black drupes, containing a small unilocular nut, and all attached to a fleshy receptacle.

This shrub is a native of Surinam, and is cultivated in Cayenne, and in several of the West India islands. It is remarkable for the beauty of its flowers, which appear in great profusion during November and December. This furnishes the true Quassia, although the article now known under that name is the product of a wholly different plant, which does not occur in Surinam, and is a lofty tree belonging to a distinct genus, having polygamous and pentandrous flowers, whilst in this the reproductive organs are hermaphrodite and decandrous.

It appears that when first discovered, the root only was used, but afterwards the wood of the trunk; this is very analogous, in its physical qualities, to

that of the *Picræna*, just described, though as then stated, there is much reason to believe that they are of a higher order, and may possess the medicinal powers ascribed to them by all writers, at the commencement of the last century. Be this as it may, it is certain that the Quassia, as now found in commerce, is very far from possessing the efficacy formerly attributed to it, being merely a simple tonic of very little superior virtue than Sabbatia or Anthemis.

Besides the plants already noticed, several others of the order are possessed of much the same qualities. The *Nima quassioides* is employed as a bitter tonic in the north of India, and the *Samadera indica* furnishes the Niepa bark, which is in some esteem as a febrifuge. The *Brucea antidysenterica*, erroneously supposed to be the origin of the false Angustura bark, is spoken of by Bruce (*Append. to Trav.*) as of much utility in dysentery, and the *B. sumatrana* is thought by Dr. Roxburgh to possess the same remedial qualities; he states that the bark is fœtid and intensely bitter. There is another plant noticed by Horsefield, under its Javanese name of *Franolot*, which appears to be a species of this genus; it has the same properties, and has been administered with much advantage.

Order 34.—ZYGOPHYLLACEÆ.—*Lindley.*

Flowers regular. Sepals 5, distinct, or scarcely cohering at base. Petals as many as, and alternate with the sepals; unguiculate, inserted on the receptacle. Stamens twice as many as the petals, hypogynous. Anthers fixed near their middle. Ovary of 4—5 united carpels, surrounded at base with 5 scales or a sinuate disk. Styles five, united into one. Fruit a capsule of 5 carpels, 4—5-seeded, dehiscent at the superior angle. Seeds albuminous or exalbuminous. Albumen cartilaginous or horny. Embryo green, straight. Cotyledons foliaceous.

This small order is composed of trees, shrubs, and herbs, whose branches are mostly articulated at the nodes, and whose leaves are usually compound, opposite, having stipules at their base, and not dotted. The species are principally natives of warm climates; and but few of them are possessed of medicinal qualities, but some are endowed with no inconsiderable powers. Besides the Guaiacums, several others of the order have attracted attention; the *Zygophyllum fabago*, a native of Egypt, is said to be vermifuge, and Gmelin states that its unexpanded flower-buds are used like capers at Astracan. The juice of the *Z. simplex* is employed by the Arabs as a cosmetic (*Encyc. Bot.* ii. 441). The Hottentots are of opinion that the *Z. herbaceum* and *Z. sessilifolium* are poisonous to sheep (*Thunberg*). In Turkey, the seeds of *Peganum harmala* are used as spices and for dyeing red. The flowers of *Melianthus major* secrete so much honey, that on shaking the tree, it falls in a shower, and the *Porlinia hygrometrica* possesses qualities analogous to Guaiacum.

Guaiacum.—*Linn.*

Sepals 5, obtuse, unequal. Petals 5, equal. Stamens 10. Filaments naked. Style and stigma united. Capsule angled, 2—5-celled. Leaves abruptly pinnate.

The name of this small South American genus is derived from the Spanish word *Guayaco*, a corruption in turn of the Mexican appellation, *Hoaxacan*. The species are few and are trees of some size, having a heavy, dense wood, well known in commerce under the name of *Lignum vitæ*. They are all resinous, and possessed of stimulating properties.

G. OFFICINALE, *Linn.*—Leaves bijugate. Leaflets elliptical, obtuse. Peduncles germinate.

Linn. *Sp. Pl.* 546; Woodville, i. 43; Stokes, ii. 486; Stephenson and Churchill, ii. 90; Lindley, *Flor. Med.* 214; Carson, *Illust.* t. 17.

Common Names.—Lignum vitæ; Guaiacum.

Foreign Names.—Gayac, *Fr.*; Guaiaco, *It.*; Guayaco, *Sp.*; Franzosenholz, *Gr.*

Fig. 106.

G. officinale.

1. Corolla and stamens. 2. Seeds. 3. Fruit.

Description.—A tree of thirty or forty feet in height. Stem generally crooked, with numerous divaricated, knotty branches. The bark is smooth, but furrowed; of a green colour, variegated with white; that of the branches ash-coloured, fissured. The wood is hard and ponderous, with a dark olive-brown centre, but whitish towards the bark, and has a peculiar smell. The leaves are opposite, abruptly pinnate, consisting of two or three pairs of elliptical, entire, smooth, rigid folioles, which are nearly sessile. The flowers are pale blue, on simple, axillary, clustered footstalks, shorter than the leaves. The calyx consists of five ovate, obtuse, concave, deciduous sepals; the two outer ones being smaller than the others. The petals are five, roundish, obovate, with short linear claws, inserted into the receptacle. The stamens are ten, awl-shaped, erect, shorter than the petals, with oblong cloven anthers. The ovary is compressed, with a short awl-shaped style. The capsule is obovate, coriaceous, of a yellow colour, with from two to five rounded angles, and as many cells, opening at these angles; two or three of these cells are often abortive. The seeds are solitary, pendulous, convex on one side, angular on the other, with a cartilaginous albumen and a straight, green embryo.

This tree is a native of South America and several of the West India islands. It first became known to the Spaniards in Hispaniola, soon after the discovery of the island, where its wood had long been used by the natives as a remedial agent of great value. About the beginning of the sixteenth century, Guaiacum was introduced into Spain as a remedy in syphilis, which then prevailed throughout Europe to a terrible degree. Its fame was diffused so rapidly that, according to the testimony of the writers of the day, thousands of diseased persons had derived benefit from it within a few years after the first promulgation of its virtues. Such was the esteem in which it was held, that it is mentioned by Freind (*Hist. of Physic*) that it sold at seven golden crowns a pound.

The general mode of employing it was in decoction; this was administered in every form of the disease, and in all its stages, aided by purgatives, confinement to the house, and steam baths, with a most rigid diet. This process was continued for six weeks or even longer. So successful was this plan, that the use of mercury was given up, and the Guaiac looked upon as a true specific, which had the power of destroying the venereal virus and expelling it from the system. Among those on whom it acted in a highly beneficial manner, and whose cure by it tended in a great measure to exalt its reputa-

tion, was the celebrated Van Hutten, who was restored to health after having been subjected to eleven courses of mercurials, and published an account of his case. The use of it, however, declined, in consequence of a neglect of the severe regulations in the treatment just alluded to. After a lapse of some years, it was again restored to confidence, and Boerhaave and other practitioners of his day, speak of it in terms of the utmost confidence, but the numerous cases of failure where it alone was relied upon, again introduced the use of Mercury, and as this remedy was used with more judgment and caution than heretofore, it became the almost universal remedy. Of late years, its true powers have been more fully understood, and it is admitted that although it has no specific powers in the cure of syphilis, it is an admirable adjuvant in the treatment, especially in the secondary stages.

Both the wood and the resin are officinal. The first, which is used extensively in the arts, is well known under the name of *Lignum Vitæ;* it is imported in logs, the outer portion or sapwood of which is of a pale-yellow colour, whilst the inner or heart is of a greenish-brown, in consequence of the large quantity of resin which pervades it. As found in the shops it is in shavings or raspings, procured from the turners who work in the wood. The resin, which is usually, but erroneously termed a gum, is procured from the tree in several different modes: either by natural exudation, by tapping the tree and permitting the juice to escape and concrete, or by heating the wood, and thus distilling off the resin. This resin is found in the shops in tears or masses, but most usually in the latter form. These are of considerable size, and are generally mixed with various impurities; their colour is brownish or greenish, always assuming the latter tint when exposed to the action of the air and light. They have a certain degree of transparency, and the fracture is resinous. The smell is balsamic, but not powerful; the taste is not decided, though a burning sensation is occasioned in the throat when the resin is swallowed.

Medical Properties, &c.—Guaiacum is an acrid stimulant, proving diaphoretic in small and repeated doses, acting on the bowels in large quantities, and often stimulating the bladder. It has been frequently employed in chronic rheumatism, especially when of a syphilitic character, or in scrofulous subjects. From its good effects in this disease, it has been tried in gout with some advantage. It is in chronic diseases of the skin, however, that it has proved most beneficial either alone, or in combination with other sudorifics. Its efficacy in venereal complaints has been spoken of already. In another class of diseases, those of the uterus, especially in obstructed and difficult menstruation, it has also proved of much benefit; the volatile tincture was a great favourite with the late Dr. Dewees in these cases, and its powers in the relief of this distressing condition of the female system is confirmed by the testimony of many writers.

As the activity of Guaiacum is dependent on the resin, the operation of the wood is of course milder than that of the preparations of that article. From the stimulating qualities of the remedy, it should not be given where there is much irritation of the system, or a tendency to such a state, but its use should be confined to atonic and chronic forms of disease.

Several analyses have been made of the resin, the best of which is that of Brande in 1806. He found that when devoid of impurities it consisted of 91 parts *Guaiacin* or *Guaiacum* proper, and 9 of extractive. This Guaiacin has the properties of an acid, and is remarkable for the changes it undergoes from the influence of different agents. It has been stated by some chemists that it is composed of two isomeric acids, one soluble in ammonia, the other merely forming a tarry compound with it.

There are numerous officinal preparations of both the wood and resin. The dose of the latter in powder is from ten to thirty grains; of the tincture from one to four drachms.

Another species of this genus has also been used, the *G. sanctum*, a much smaller tree, growing principally in South America; it is possessed of the same properties as the other, but in a minor degree. The wood is paler, and lighter, and is seldom imported except mixed with the true Lignum vitæ and as an adulteration of it. It may always be distinguished by the smaller size of the billets and the less decided green tint of the heart-wood.

Group XIII.—Geraniales.

Order 35.—LINACEÆ.—*Lindley.*

Sepals generally 5, (3–5) persistent. Petals as many as the sepals, and alternate with them, hypogynous, caducous, twisted in æstivation, unguiculate. Stamens equal in number to the petals, united at base, often with an abortive filament between each; anthers innate. Ovary with as many cells as there are sepals; styles equal in number to cells, stamens capitate. Pericarp a globose capsule, with 5 (or 3–4) cells, containing 2 seeds in each. Seeds suspended, compressed, albumen none, or very thin; testa mucilaginous; embryo flat, oily.

The Linaceæ are herbaceous or suffruticose, with entire sessile leaves, which are usually alternate, or alternate and opposite on the same stem, and are without stipules. The flowers are terminal, and in corymbs or panicles. Most of the species are distinguished for the tenacity of the fibres of their bark, and the mucilaginous coating of their seeds.

Linum.—*Linn.*

Sepals 5. Petals 5. Stamens 5. Styles 3–5, distinct or connected. Capsule globose. Seeds ovate, compressed.

This genus is a very extensive one, and the species are widely diffused throughout the world; the larger proportion of them are peculiar to the warmer parts of Europe, but five or six are found in the United States, including the cultivated one.

L. usitatissimum, *Linn.*—Sepals ovate, acute, 3-nerved at base. Petals crenate. Leaves alternate, lanceolate, acute. Stems glabrous, branched above.

Linn., *Sp. Pl.* 397; Woodville, t. 111; Stokes, ii. 186; Stephenson and Churchill, i. 61; Torrey and Gray, i. 204.

Common Names.—Flax; Lint.

Foreign Names.—Lin, *Fr.*; Lino, *It.*; Flachs, *Ger.*

Description.—The common flax has a small, fibrous root, giving rise to a round, slender, smooth stem, branched above, and about two feet in height. The leaves are small, entire, lanceolate, sessile, alternate, and of a glaucous colour. The flowers are in a corymbose panicle, numerous, large, of a blue colour, and supported on long peduncles. The calyx has five lanceolate, erect sepals, which are three-nerved at base, and imbricated in æstivation. The corolla consists of five crenate, oblong petals, broad above, narrow below, and contorted in æstivation. There are five stamens, which are subulate, erect, as long as the calyx, and supporting two-celled sagittate anthers. The ovary is superior, ovate, and surmounted by five blue, slender styles. The fruit is a globular capsule, with five cells, containing two seeds each, divided from each other by a false dissepiment. Seeds elliptical, smooth, brown, and shining.

It is by no means certain where Flax is truly indigenous, for although it has become naturalized in most parts of Europe, and partially so in the United

States, its original habitat is probably in more eastern climates. It was known at a very early period, as it is mentioned in the ninth chapter, thirty-first verse of Exodus, as growing in Egypt, and although there has been much difference of opinion among commentators, as to whether the fine linen mentioned in various places in Scripture, was a cotton or flax fabric, it is now generally conceded that it may mean both, as it is clear that flax was cultivated at an epoch anterior to any historic record, and also that it was used for the fabrication of cloth, as is shown by linen being found as envelopes to mummies. It is true that cotton was also used for this purpose, and Forster, in a curious dissertation on the subject, states that the words translated linen, in the Scriptures and ancient histories, most frequently should be rendered cotton; but even allowing this, it is also certain that flax was used as an article of manufacture during the first ages. At present, this plant is grown far more extensively in northern than in southern countries, both on account of the fibres of its stem in making thread, and also for the oil obtained from its seeds.

It need scarcely be said, that the substance called flax is prepared from the fibrous portions of the bark. From this flax, linen is made, which, when scraped, is termed lint, in which form it is extensively used as a dressing to wounds. The seeds and the oil extracted from them are officinal. These seeds are small, oval, flattened at the sides, shining, of a brown colour. They are devoid of smell, and have a mucilaginous taste when unbroken, which becomes oily if they are chewed. The cuticle affords a peculiar gummy matter when the seeds are steeped in warm water; the viscid mucilage thus obtained is inodorous, and possesses very little taste. By expression, a peculiar oil is extracted from the bruised seeds; this oil is bland, sweetish, and has but little smell when heat has not been used in its preparation. As found in commerce, however, from the seeds being roasted before they are subjected to pressure, the oil is of a yellowish-brown colour, nauseous taste, and disagreeable smell. This oil, which is known under the name of *Linseed oil*, is largely employed in the arts, especially in painting, and in the manufacture of printers' ink. It becomes solid on exposure to the action of the air, or in other words, is one of the *drying oils;* it does not congeal except at temperatures below zero, and boils at 600° F. Flaxseed contains about one-fifth of mucilage, and one-sixth to one-fourth of oil. The cake, or refuse, remaining after the expression of the oil, is much used for the fattening of cattle, under the name of oil-cake.

Medical Properties, &c.—The mucilage from the seeds made by infusing half an ounce of them, unbroken, in a pint of hot water, has been found highly useful as an emollient and demulcent in inflammations of the mucous membranes: when a decoction of the seeds is made, it always contains a portion of the oil, which renders it unpleasant to the taste, but adds to its power as a laxative injection. Flaxseed meal when mixed with hot water forms an admirable emollient poultice. The oil is laxative in doses of half an ounce to an ounce, but is seldom given on account of its disagreeable taste. Stephenson and Churchill state, that when cold expressed, it is an excellent corrector of habitual costiveness, in doses of a tablespoonful, and that the addition of a small quantity of tincture of rhubarb will enable it to agree with the most fastidious stomach. The most general use of the oil, as a remedial agent, is in combination with lime water, as a liniment to scalds and burns.

Several analyses have been made of the mucilage, from which it is found to consist of two parts, the one soluble, analogous to arabine, and constituting about one half; the other not soluble in water, and not yielding mucic acid. The oil is constituted of oleic acid, margaric acid, and glycerine, of which the first is in the largest proportion.

Several other species of Linum have been used in medicine, especially the *L. catharticum*, a native of Europe, where it was formerly in some repute as a cathartic and diuretic. It is still employed in Sweden, especially as an anthelmintic. The dose is 3j. in substance, or 3ij. in infusion.

Order 36.—OXALIDACEÆ.—*Lindley.*

Sepals 5, persistent, æstivation imbricated. Petals 5, hypogynous, deciduous; æstivation spirally twisted. Stamens 10, monadelphous. Ovary of 5 united carpels; styles distinct. Capsule membranaceous, 5-lobed, 5-celled: carpels 1–12-seeded. Seeds anatropous. Embryo straight, cotyledons broad and foliaceous.

This natural order, which was formerly included in the Geraniaceæ, consists of herbaceous plants, shrubs, and trees, mostly having alternate, compound leaves with petioles articulated at the base, sometimes, but rarely the leaves are opposite and in whorls. They all abound in an acid juice, and hence have been much used as antiscorbutics and refrigerants.

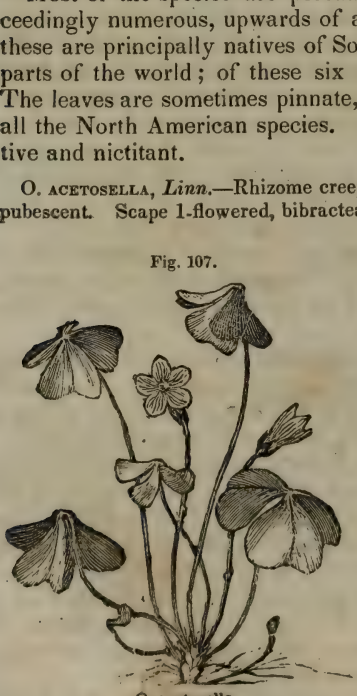
Oxalis.—*Linn.*

Sepals distinct, or only united at base. Capsule 5-celled, membranaceous, angular. Seeds with an elastic testa, many in each carpel.

Most of the species are perennial, a few only being annual; they are exceedingly numerous, upwards of a hundred species having been described; these are principally natives of South Africa, a few only being found in other parts of the world; of these six or eight are indigenous to North America. The leaves are sometimes pinnate, though in general, they are trifoliate, as in all the North American species. In all, these organs are more or less sensitive and nictitant.

O. acetosella, *Linn.*—Rhizome creeping. Leaves radical, ternate; leaflets obcordate, pubescent. Scape 1-flowered, bibracteate.

Fig. 107.



O. acetosella.

Linn., *Sp. Pl.* 602; Torrey and Gray, *Fl.* i. 211; Woodville, *Med. Bot.* t. 20; Stokes, ii. 555; Stephenson & Churchill, i. 63; Lindley, *Fl. Med.* 222.

This plant is found in most parts of Europe, and also occurs in the more Northern States in this country. It is perennial and usually grows in moist shady woods, flowering in May and June. It is very acid to the taste, and was formerly in much repute as a refrigerant. Old Gerarde notices in his Herbal, that among its various names it has received those of Cuckoo-meat and Alleluya, "by reason when it springeth forth and flowereth, the cuckoo singeth most; at which time also Alleluya was wont to be sung in churches;" this latter name is also bestowed upon it in Italy, and is perhaps a corruption of its Calabrian appellation, *Lujula*, though Gerarde may be right in the explanation he has given. It has been satisfactorily shown by Mr. Bicheno (*Phil. Mag.*) that this plant is the Shamrock of the Irish, which is generally supposed to be the Clover.

The Wood sorrel is now seldom used in medicine; it is, however, a good antiscorbutic, and the bruised leaves have been employed with advantage as an external application to scrofulous ulcers. The juice is also sometimes used as a cooling drink in febrile complaints, either diluted with water, or boiled with milk so as to form a whey. The principal value of the plant arises from the quantity of binoxalate of potash it contains. Neuman obtained two ounces two drachms and one scruple of this salt from six pounds of the juice; in Switzerland and some parts of Germany, where this manufacture is carried on to some extent, it is calculated that 500 parts of the fresh plant furnish four of the pure salt.

No detailed analysis of it has been made, but it is probable that in addition to the oxalate of potash, that it contains merely the usual vegetable constituents. This salt also exists in the other species of the genus, as the *O. corniculata* and *O. violacea*, as well as in many plants not allied to them, as in several species of *Rheum* and *Rumex*.

Order 37.—GERANIACEÆ.—*De Candolle.*

Sepals 5, persistent, sometimes spurred at base, with an imbricate æstivation. Petals 5 (by abortion sometimes four) hypogynous, unguiculate, with a twisted æstivation. Stamens usually monadelphous at base, as many or twice as many as sepals; anthers fixed by the middle, introrse. Ovary of 5 lobes, each 1- or 2-celled, placed alternate with the sepals, round an elevated axis; styles 5, cohering round the axis. Pericarp of 5 carpels, united to the central axis, and when mature separating by the twisting of the permanent style. Seeds solitary, exalbuminous, with a lateral hilum; radicle straight, cotyledons convolute, plaited.

This extensive order, which is mainly constituted of the genus *Geranium* of Linnæus, contains an immense number of herbaceous, rarely shrubby plants, having tumid stems which are separable at the nodes; the leaves are mostly apposite, generally furnished with stipules, petiolate, palmately-lobed or divided, though sometimes entire. The peduncles are terminal or axillary. The general character of this order is astringency.

Geranium.—*Linn.*

Sepals equal. Petals 5, equal, regular. Stamens 10, fertile; the alternate ones larger, each with a melliferous gland at base. Arilli 5, 1-seeded, awned, awns naked at length revolute.

The genus Geranium, as now recognised by botanists, is confined to those species having ten fertile stamina, those with five forming the genus *Erodium*, and those with seven, *Pelargonium*. The species are almost all herbaceous, and are principally natives of Europe; about six are found in North America, of which several are common to both continents. The name is derived from the Greek appellation of the crane, from a supposed resemblance of the permanent style to the bill of that bird.

G. maculatum, *Linn.*—Stem erect, pubescent, dichotomous; leaves 3—5 parted, incised; cauline opposite, radicle on long petioles; petals entire; peduncles long.

Linn., *Sp. Pl.* 955; Bigelow, *Med. Bot.* i. t. 8; Barton, *Veg. Mat. Med.* i. t. 13; Torrey and Gray, *Fl.* i. 206; Lindley, *Fl. Med.* 221.

Common Names.—Crowfoot; Alum Root; Common Crane's-bill, &c.

Foreign Names.—Bec de grue, *Fr.*; Gefleckter Storchschnabel, *Ger.*

Fig. 108.

G. maculatum.

Description.—Root perennial, irregularly gibbous and horizontal, brownish, mottled with green externally, and greenish-white internally. From the root spring a number of radical leaves and one or more stems; these latter are erect and terete, of a green colour and furnished with reflexed hairs. At the height of six to ten inches, the stem becomes forked, and at the point of division are two large, petiolate leaves, which are generally reflexed. The leaves on the upper part of the stem are either sessile or with very short petioles. The peduncles arise from the dichotomous divisions of the stem, and bear two flowers on short pedicels. The calyx consists of five, oval, lanceolate, ribbed, cuspidate sepals, plumosely ciliate on their outer margin, and membranaceous on the other; sometimes three only of the sepals are ciliate. The petals are five, obovate, not emarginate. The stamens are ten, furnished at base with glands, and terminated by oblong, convex, deciduous anthers of a purple colour. The ovary is ovate, bearing five styles, at first about the length of the stamens, but finally longer; the styles cohere to a permanent central axis before maturity, but separate from it in a twisted form when the seed is ripe. The capsule contains five seeds, which become detached by the elasticity of the awns.

There are numerous varieties of this species; in the form of the leaves, colour of the flowers, and pubescence of the stem; these depend on accidental causes, as soil, exposure, &c. It is found in all parts of the United States, generally growing in thickets, borders of wood, and hedges, where the soil is low and damp, but is by no means confined to such situations. It flowers in April and May.

It was known to, and much esteemed by, the Indians, as an astringent; but the first account of its medical properties was given by Coelln in the fourth volume of the Amœnitates Academicæ, on the authority of Colden; he states that it was found useful in dysentery. Shoepf, who seems to have considered that every plant must be endowed with remedial powers, was not likely to pass over one manifesting such marked qualities as the Geranium, and speaks of it in high terms as a useful astringent. It is now recognised as a regular article of the Materia Medica, and is admitted into the primary list in the Pharmacopœia.

Medical Properties, &c.—From the concurrent testimony of all who have given the Geranium a fair trial, it is shown that it is a powerful astringent,

and very similar to Kino and Rhatany in its action on the system. The statements of Colden and Schoepf in relation to the efficacy of the root in dysentery have been adverted to; and it may be mentioned, in corroboration, that it is known under the name of Alum root in many parts of the country, and is much prized in the treatment of the secondary stages of bowel complaints. Dr. B. S. Barton speaks favourably of a decoction of it in milk, in cholera infantum, and Dr. Eberle states that it is much used in this complaint by the inhabitants of Lancaster county. As a remedy in aphthous affections of the mouth, and in ulcerations of the fauces and tonsils, it has proved highly successful. Dr. Eberle observes, "In a chronic and very obstinate case of aphthous ulceration of the mouth, after various articles had been used by other physicians and myself unsuccessfully, the patient was relieved by the use of gargles made of the root of this plant." This testimony of its powers is confirmed by Zollickoffer and others. The Geranium has also been advantageously employed as a substitute for Kino and Rhatany, in cases in which these articles are indicated.

The part used is the root, which is found in the shops in the form of wrinkled, rough pieces, of various sizes, of a dark-brown colour externally, and pale flesh-colour within; the taste is astringent, but not bitter, and scarcely any smell. It may be given in a variety of modes. Of the powder the dose is from ten to thirty grains. Of the tincture from two drachms to half an ounce. The decoction is made by boiling an ounce of the bruised root in a pint of water; the dose is from one to two tablespoonsful. The best form of exhibition is in extract; this, when properly made, closely resembles that of Rhatany, and may be advantageously substituted for it.

No complete analysis has been made of this root. Dr. Bigelow, however, gives the result of an examination of it, in which he found gallic acid and tannin, and states that it afforded a larger precipitate with gelatin than Kino. A later series of observations by Dr. Staples (*Jour. Phil. Coll. Pharm.* i. 171), show that it contains a large quantity of gallic acid, tannin, mucilage in small proportion, amadin, red colouring matter from the cortical portion, a small quantity of resin, and a peculiar crystallizable principle.

Several species of Geranium have been used in medicine, with some success, especially the *G. Robertianum* and the *G. sanguineum*, both natives of Europe, but the first also found in the United States. They possess the same properties as the *G. maculatum*, but in a minor degree, but are also said to be diuretic, and to have proved useful in diseases of the kidneys and bladder.

Group XIV.—Sapindales.

Order 38.—SAPINDACEÆ.—*Jussieu.*

Calyx 4—5-parted, or 4—5-leaved, æstivation imbricated. Petals 4—5, sometimes absent, alternate, with the sepals hypogynous, sometimes naked, sometimes with a doubled appendage on the inside; æstivation imbricated. Disk fleshy, regular, expanded between the petals and stamens, sometimes glandular, the glands between the stamens and petals. Stamens 8—10 (rarely 5—7) seldom 20, inserted on the disk, or on the receptacle. Filaments free, or connected at base. Anthers introrse. Ovary 3-celled, rarely 2—4-celled, cells containing 1—3, seldom more, ovules. Style simple, or 2—3-cleft. Fruit sometimes capsular, 2—3-valved, sometimes a samara, sometimes fleshy and indehiscent. Seeds generally with an aril; the outer integument crustaceous, or membranous, the inner pellucid. Embryo usually curved or spiral, seldom straight. No albumen.

The Sapindaceæ are usually large trees, sometimes climbing shrubs, and rarely twining herbs, with alternate, compound, rarely simple, leaves, with or

without stipules, and often marked with lines or pellucid dots. The species differ widely from each other, but all have unsymmetrical flowers, the petals have an appendage, and the embryo is curved or spiral. They are principally natives of tropical regions, though some are found in more temperate climates.

Their physical properties are very various, but a saponaceous principle appears to be very general in the fruits or seeds; but in some is very slight, or so modified as to be scarcely perceptible. Thus the berries of *Sapindus saponaria* and others lather freely with water, and are used in the West Indies as a substitute for soap. The seeds of the various kinds of Horse Chestnut also possess this property.

Many of them, however, are edible, and in some cases delicious; for instance, the Longan and Litchee are the product of species of *Nephelium*. The Fruta de Parao, a sweet and pleasant Brazilian fruit, is derived from the *Schmidelia edulis*. The *Melicocca bijugis* of the West Indies bears agreeable, sub-acid drupes. Some species of *Sapindus* also afford edible berries, &c. But the products of this order are always suspicious, and even where the fruit may be partaken of with impunity, the seeds are oftentimes injurious; for example, although the drupes of *Nephelium* can be freely eaten, the seeds are exceedingly bitter, and in *Sapindus* they are actively poisonous. The nuts of the Horse Chestnut also contain a bitter, narcotic principle; and in various species of *Paullinia* a deleterious constituent is much developed, especially in *P. pinnata*, the whole abounding in an acrid juice, from which the natives of Brazil prepare a potent poison, which is capable of slowly but certainly destroying life; from the *P. curruru* the savages of Guiana obtain a venom for their arrows, and from *P. cupana* an intoxicating drink is prepared.

The most interesting product of this order is that of the *P. sorbilis*, the seeds of which are used in Brazil to prepare a cake or bread, called *Guarana;* according to Martius, this is pounded and mixed with sweetened water, and is esteemed stomachic, febrifuge, and aphrodisiac; he says that it is certainly endowed with great powers, and states that it is very useful in diseases of the urinary organs; in Brazil it is considered as an indispensable requisite for travellers, on account of its restorative qualities. It owes its powers to the presence of a peculiar principle called *Guaranine*, which appears to be identical in composition with théine and caffeine. (See Dunglison, *New Remedies*, 489.)

Many other plants of this order are useful in medicine and the arts. The root of *Cardiospermum halicacabum* is sudorific, diuretic, andaperient; and on the Malabar coast the leaves are considered efficacious in pulmonic affections (*Ainslie*, ii. 204). The *Dodonœas* are somewhat aromatic; but the wood of *D. angustifolia* is said by Thunberg to be purgative. The root of *Schmidelia serrata* is employed in India to check obstinate diarrhœa (*Ainslie*, ii. 413).

Æsculus.—*Linn.*

Calyx 5-toothed, campanulate. Petals 4—5, irregular, unequal. Leaves palmate, 5—7 foliolate. Flowers in terminal racemes or panicles.

This genus, which contains many species, is almost exclusively North American, and has been variously divided by botanists from the armed and unarmed character of the fruit, &c.; but the differences pointed out are scarcely sufficient to entitle these divisions to more than sectional, or at most

sub-generic rank. Their medicinal qualities are much the same, being tonic, and sometimes narcotic and emetic.

Æ. HIPPOCASTANUM, *Linn.*—Leaves digitate, with 7 obovate, acuminate leaflets. Petals 5. Stamens 7. Fruit echinate.

Linn., *Sp. Pl.*, 488; Woodville, 349; Stephenson and Churchill, ii. 68; Lindley, *Fl. Med.*, 124.

Common Names.—Horse-chestnut, Buck-eye.

Foreign Names.—Marronier d'Inde, *Fr.*; Castagno d'India, *It.*; Ross-kastanienbaum, *Ger.*

Description.—A beautiful and lofty tree, with numerous, spreading branches, covered with a rough, brown bark. The wood is white and soft, and is very liable to decay. The leaves are on long footstalks, are large, and composed of seven leaflets, arising from a common centre, the middle one being the largest; they are of a spathulate form, acuminate, serrate, much varied, and of a bright green colour. The flowers are in thyrsoid racemes or panicles, at the extremity of the branches. The calyx is pale green, 5-toothed and spreading. The corolla is formed of five petals, which are irregular, unequal, spreading, inserted into the calyx by narrow claws, waved at the edges, of a white colour, marked below with a yellowish-red spot. The stamens are seven, with awl-shaped filaments, supporting reddish, oblong, double anthers. The ovary is roundish, and furnished with a short style and pointed stigma. The fruit is prickly, coriaceous, roundish, 3-celled, and usually containing two seeds. These seeds are exalbuminous, with a brown, shining testa, and a large, paler hilum.

Fig. 109.

Æ. hippocastanum.
a Flower. *b* Fruit.

This magnificent tree is a native of the northern region of Asia, but has been cultivated in most parts of Europe since the middle of the sixteenth century, when it was introduced by Clusius; it was brought to this country soon after its settlement, where, however, it is not commonly planted, as its place is supplied by native species of equal beauty. It is of rapid growth, and flowers in May and June, ripening its fruit late in the autumn.

The *Æsculus* of the Romans was a kind of oak, and not the tree now under consideration, which, as before said, was not known in Europe until the year 1550, when it was described by Matthiolus, from specimens received from Constantinople. At the time Clusius wrote, it was still so scarce, that but one tree existed at Vienna. Even at the period of the publication of Parkinson's great work, it was so little known, that he mistakes it for a kind of chestnut, and observes, "it is of greater and more pleasant aspect for its fair leaves, but also of as good use for the fruit, which is of a sweet taste, roasted and eaten, as the ordinary sort of chestnut." The tree is said to derive its name from the fact that horses will eat the nut greedily. They are also eaten by sheep, goats, and deer; but their extreme bitterness requires to be de-

stroyed, by steeping in some alkali, before the first of these animals will taste them. They have been used in this way, and also by permitting them to germinate, which, as with barley, developes a saccharine matter, to some extent in Europe as a food for cattle, and it is said, that mixed with the provender of cows, they increase the quantity of milk. They contain a saponaceous principle, which has been taken advantage of in the fulling of stuffs and cloths. A paste has also been made from them, which is said to be preferable to any other, as not only possessing great tenacity, but likewise from the circumstance that no moths or vermin will attack any thing cemented with it. The fruit has also been applied to a variety of other purposes; but the most valuable of all its uses is the formation of starch, which is superior to that from any of the cerealia.

In a medicinal point of view, this tree is also deserving of attention, as, from numerous trials made with the bark, it appears that it is possessed of powerful febrifuge properties. A notice of this was given in a paper read before the Royal Academy of Sciences of Paris, in 1720, by the president, Bon; but the attention of the profession was not attracted towards it until about 1733, when Zanichelli, an apothecary of Venice, published a full account of its virtues. It was, in consequence, experimented upon by numerous practitioners, and generally with much success, though by some its curative powers were wholly denied. It, however, was almost forgotten, when, at the commencement of this century, the French government directed the medical men of France to examine and report on its real value as a febrifuge. This was done, but the reports were of the most contradictory character; and it is evident, from a review of them, that, although the Horse-chestnut bark is capable of removing the paroxysms of intermittent fever, it is far inferior, not only to cinchona, but also to many other of the bitter tonics. It was at one time thought that it was analogous in composition to the Peruvian bark; but the analysis of Pelletier and Caventou shows that it contains a reddish astringent matter, a greenish oil, a yellow colouring substance, an acid, &c., but no trace of any alkaloid. (See Dunglison, *New Remedies*, 351.)

The American species are numerous, and all but one belong to the section *Pavia*, having an unarmed fruit. They are known in the Western States, where they grow in great abundance, under the name of Buck-eye, from a supposed resemblance between the nut to the eye of the deer. The roots of several of them are saponaceous, and used to cleanse woollen stuffs. They, as well as the branches and leaves, are somewhat narcotic; and the fresh fruit, macerated in water and made into a paste, will stupify fish. In some experiments made on the nuts of the small Buck-eye (*Æ. pavia*) by Dr. Woodhouse, he found that the starch is superior to that from wheat; that it is readily procured, and keeps for a great length of time; and also, that the water of the fresh washings of the flour is narcotic and poisonous. Dr. McDowell, of Danville, tried the powder of the rind in some cases, and states that ten grains of it were equivalent to three grains of opium. A strong decoction of the bark has been recommended as a lotion to gangrenous ulcers.

Order 39.—ERYTHROXYLACEÆ.—*Lindley.*

Sepals 5, combined at base, persistent. Petals 5, hypogynous, broad at base, with a plaited scale, equal. Stamens 10, monadelphous, anthers innate, erect, 2-celled, dehiscing longitudinally. Ovary 3-celled, with two of the cells spurious; styles 3, distinct or united to near the tip; stigmas 3, capitate; ovule solitary, pendulous. Fruit drupaceous, 1-seeded. Seed angular; albumen between fleshy and mealy, or none. Embryo straight.

These are trees or shrubs, the young shoots often covered with acute imbricated scales, and compressed; the leaves are usually smooth and alternate, with stipules within the petioles. The flowers are small, whitish, or greenish. They are mostly natives of South America and the West Indies; a few species are found in the tropical regions of Asia.

Many of the species afford useful products. A brown dye is obtained from the bark of *Erythroxylon suberosum*. The young branches and leaves of the *E. areolatum* are said to be cooling, and when mixed with benne oil form a refreshing liniment for the head. The bark is also used as a tonic. (*Ainslie*, ii. 422.) The bark of *E. anguifugum* is thought to be an antidote against snake-bites in Brazil, and that *E. campestre* is employed in the same country as a purgative. (Martius, *Mat. Med. Bras.*)

The most important plant of the order is the *E. coca*, a species found in many parts of North America, and extensively cultivated in Peru and Bolivia. The leaves, which apparently are almost devoid of activity, having merely a slight scent and a grassy, bitterish taste, are a very powerful stimulant, and operate on the system somewhat like opium, except that they do not produce as marked a narcotic influence. Their use among the Indians of parts of South America is very great, according to Poeppig, (*Travels.*) The value of the Coca crop in Peru and Bolivia is upwards of two and a half millions of dollars, and 2000 persons are occupied in the culture of the plant. The leaves are dried in the sun, and packed tightly in bales; they are chewed with the addition of a small quantity of quicklime; and the consumption averages an ounce and a half a day with those who use it moderately; but inveterate chewers have been known to use four ounces. It has been stated by some writers to contain much mucilage, and to be stomachic and nutritive. This is denied by Poeppig, who says that it is an active stimulant of very peculiar powers. Its first destructive effects on the system are shown in a derangement of the digestive organs, followed by bilious symptoms, jaundice, deprivation of sleep, and a frightful train of nervous phenomena. It appears to be less violent in its first effects than opium, but that a long-continued use of it is more injurious.

Fig. 110.

E. coca.

It has been employed from time immemorial, and is extensively used by the natives as a restorative when engaged in any laborious work, as in long journeys, mining, &c. They insist that it prevents hunger, and enables them to undergo the most severe toil with impunity. From the accounts of recent travellers, there appears to be no doubt of its powerful stimulant powers, and of its restorative qualities when the body is exhausted by exertions of any kind; and also of its finally injuring the constitutions of those using it, in an irreparable manner. No correct analysis has been made of it. The active principle appears to be volatile, as it does not afford any peculiar product on distillation. A full account of it is given in Hooker's Companion to Bot. Magazine, 1, and Ruschenberger, Three Years in the Pacific, 176.

Group XV.—Rhamnales.

Order 40.—RHAMNACEÆ.—*Lindley.*

Calyx 4—5-cleft, æstivation valvate. Petals 4—5, sometimes wanting, inserted in the orifice of the calyx. Stamens equal in number to the petals, with introrse or versatile anthers. Ovary of 2—4 united carpels, 2—4-celled, each with a solitary ovule. Styles more or less united. Stigmas usually distinct, simple. Fruit sometimes dry and capsular, dehiscing by three valves, sometimes fleshy and indehiscent. Seed erect, not arilled, albumen fleshy. Embryo erect. Radicle short. Cotyledons large, flat.

The Rhamnaceæ consist of trees and shrubs, with oftentimes thorny branches. The leaves are simple, alternate, rarely opposite, and mostly furnished with very small stipules. The flowers are small, usually of a whitish or greenish-white colour, sometimes monœcious, diœcious, or polygamous by abortion. The species are found in most parts of the world, except in the arctic zone.

The properties of the various plants of this order are very diversified. The fruit of some of them is actively purgative, as in *Rhamnus;* in others, as in *Zizyphus*, it is nutritive and demulcent; thus some of the species, as *Z. vulgaris*, *jujuba*, &c., furnish the gummy extract known as jujube paste. The berries of *Z. lotus*, or lote-bush, are much used for food among the Arabs. In *Hovenia dulcis* the peduncle becomes much enlarged and succulent, and is in great repute in China as a fruit, resembling a fine pear in taste. Several others also furnish edible fruits.

Fig. 111.

Z. lotus.

Some species are astringent, hydragogue, &c. The bark of *Zizyphus joazeiro* is bitter and astringent, with some acridity; that of *Z. napæa* is used as a remedy in windy colic. The leaves of *Z. trinervius* are employed in India as alteratives in chronic cutaneous and venereal affections (*Ainslie*, ii. 69). Anti-syphilitic virtues are also attributed to *Berchemia volubilis;* and the bark of the *B. lineata* is said to be hydragogue.

Rhamnus.—*Linn.*

Calyx 4—5-cleft, often circumscissile after flowering, the lower part permanent. Petals 4—5, or none. Stamens inserted opposite the petals. Styles 2—4, connate. Fruit baccate, 2—4-celled. Seeds with a deep groove.

This is a large genus, the species of which are either trees or shrubs, some with perennial and others with deciduous leaves, and differing much in the number of male organs, some being tetrandrous and others pentandrous. They are found in all parts of the world, but principally in America and the south of Europe. But one of them has been recognised as officinal.

R. CATHARTICUS, *Linn.*—Erect, branches thorny at the summit; leaves ovate, serrate; flowers polygamous-diœcious, usually tetrandrous; berry 4-seeded.

Linn., *Sp. Pl.* 279; Woodville, t. 114; Stephenson and Churchill, ii. 119; Torrey and Gray, *Fl.*, i. 261; Lindley, *Flor. Med.*, 167.

Common Name.—Buckthorn.

Foreign Names.—Nerprun, *Fr.*; Ramuno catartico, *It.*; Gemeine Kreuzdorn, *Ger.*

Description.—The Buckthorn is a large shrub, with a dark-brown bark and yellowish wood. The branches are alternate or nearly opposite, spreading, and armed with spines at the extremity. The leaves are simple, entire, smooth, ovate, serrate, and of a bright-green colour. The flowers are small, of a greenish colour, and borne at the extremity of the branches of the former year. They are generally of different sexes on different plants, though sometimes polygamous; the fertile flowers have the rudiments of stamens, narrow petals, and four almost united styles; the barren ones have an abortive ovary and broader petals. The anthers are small, rounded, and borne on short, subulate filaments, which are inserted in the mouth of the calyx. The berries are globular, about as large as a pea, black when ripe, and containing a green pulp, with four cells, and as many seeds, which are smooth, elliptical, convex on one side and flattened on the other.

This shrub is a native of many parts of Europe, and has been found in several places in the United States, apparently in a wild state, but probably introduced. It flowers in May and June, and ripens its fruit in September and October. The berries have an unpleasant smell and a disagreeable, bitter taste. They have, however, long been used in medicine as a purgative; but are more generally employed, at the present day, in the manufacture of a pigment, known under the name of *Sap Green*. This is the inspissated juice, with the addition of a little alum; or else it is prepared by adding lime-water and gum arabic to the juice, and evaporating to a proper consistence.

Medical Properties, &c.—The juice of the berries is a violent, drastic purgative, sometimes causing serious irritation of the bowels, and hence it is now but seldom used. Corvisart, however, thought so highly of the hydragogue powers of the syrup, that he habitually employed it in almost all cases of serous affections; and it is still considered of value by some European practitioners as a revulsive, when it is wished to make a powerful impression on the bowels. The drastic qualities of this remedy are much modified by the addition of aromatics and the use of demulcents to sheathe the bowels. It is, however, a remedy that may well be dispensed with, and is not recognised by our national Pharmacopœia. The juice of the berries has been analyzed, and found to contain, in addition to the usual constituents, a peculiar purgative principle, somewhat allied to cathartine, but differing in some respects from that substance. The mucilage is also peculiar, as it disappears on fermentation.

The berries of several other species of Rhamnus are used in the arts. Those of the *R. infectorius* are known under the name of French Berries, and are largely employed in calico printing. They are also used to give the colour to yellow morocco. The *R. alaternus* affords a fruit which is employed for the same purposes. Another species, the *R. paliurus*, is said to be one of the most common shrubs in India, and is supposed by some to

be the plant from which the crown of thorns placed upon the head of Christ was composed.

Ceanothus.—*Linn.*

Calyx 5-cleft, campanulate, circumscissile, lower part permanent. Petals 5, unguiculate. Stamens 5, exserted. Styles 2—3, united to the middle, diverging above. Capsule 3-angled, 3-celled, 3-seeded; cells opening by the inner suture.

This almost American genus consists of shrubs or shrubby plants, which are unarmed. The roots of the whole of them are large, reddish, and astringent. The leaves are alternate, usually ovate or elliptical, serrate or entire, persistent or deciduous. The flowers are white, blue, or yellowish in umbel-like fascicles, which are aggregated at the extremity of the branches. It is probable that the medical properties of all the species are very much the same, though one only, has attracted attention.

C. americanus, *Linn.*—Leaves ovate, or oblong-ovate, smooth above, tomentose beneath. Panicles axillary, peduncled, elongate, leafy.

Linn., *Sp. Pl.*, 284; *Bot. Mag.*, 1479; Darlington, *Fl. Cest.*, 148; Torrey and Gray, *Fl.*, i. 264; De Candolle, *Prod.*, ii. 31.

Common Name.—New Jersey Tea.

Description.—Root dark-red. Stem shrubby, suffruticose, from one to three feet high, with many branches, the younger of which are pubescent. The leaves are 3-nerved, rounded, or a little cordate at base, ovate or oblong-ovate, somewhat acuminate at the apex, serrate, nearly smooth above, and whitish, tomentose beneath, the pubescence of the veins and petioles somewhat reddish. The calyx is white, 5-cleft, and the upper portion separates by a transverse line, leaving the tube adhering to the fruit. The corolla is formed of five saccate, arched petals, which are longer than the calyx, and with filiform claws at base. The stamens are five, exserted, and bearing ovate, 2-celled anthers. The ovary is 3-angled, and surrounded with a 10-toothed disk. The styles are three, united to the middle, but diverging above. The fruit is dry and coriaceous, obtusely triangular, 3-celled and 3-seeded. The seeds are convex externally, and concave within, the cavity marked with a longitudinal line.

The New Jersey Tea is found in all parts of the United States, in copses and dry woods, flowering from June until September. There are several varieties, differing principally in the form of the leaves. It is a well-known plant, and is celebrated for having been much used during the Revolutionary war as a substitute for the Chinese tea, whence its common name. The leaves when dried have an odour very much resembling that of the black tea of commerce, and are said to form an excellent substitute for it. They are slightly bitter, and somewhat astringent. The root is much more active, and was in use among the Indians as an astringent and febrifuge, and was afterwards very much employed as a remedy in gonorrhœa and even syphilis. In the first of these complaints, it is stated by Ferrien, a cure is effected in two or three days; and in the latter, even inveterate cases yield to it in fifteen. It is given, he says, in decoction, made with two drachms of the root to the pint of water. Adanson also observes that he has employed it in these diseases with success. We quote this from Merat and De Lens' Dictionary, not having seen the works in which these statements are made; but they receive confirmation, in part at least, from the success that has attended this method of cure by empirics in our country. Dr. Hubbard (*Boston Med. and Surg. Journ.*, Sept. 1835) speaks in high terms of a decoction of the leaves as a wash and gargle in the aphthæ of children, and in those cases of sore mouth subsequent to fever, and states that he was successful with it

even where all other means had failed. He also found it beneficial in those cases of ulceration of the fauces attendant on scarlatina; in these he used it in combination with Mayweed (*Maruta cotula*) and borax. He further adds, that as an astringent in dysentery, he found it fully as efficacious as the Hardhack (*Spirea tomentosa*).

With this testimony in its favour, it well deserves a more extended trial, and if it should be found to merit even in part what has been said of it, it will rank as an important article of our native Materia Medica. It may be mentioned, that the *C. cæruleus* is considered as a powerful febrifuge in Mexico, and that the *C. decolor* is employed in dysentery in Senegal.

Order 41.—CELASTRACEÆ.—*Lindley.*

Sepals 4—5, imbricated, inserted in the edge of an expanded disk. Petals as many as sepals, inserted by a broad base into the disk; æstivation imbricate. Stamens as many as petals, and alternate with them, inserted on the margin, or within the edge of the disk. Anthers innate. Disk large, expanded, flat, closely surrounding the ovary. Ovary immersed in the disk, free from the calyx. Fruit superior, 2—5-celled, either drupaceous or capsular. Seeds ascending, either arillate or the reverse. Albumen fleshy. Embryo straight.

An order composed of small trees or shrubs, with alternate, seldom opposite, simple leaves, with small deciduous stipules. The flowers are small, green, white, or purple, in axillary cymes. The species are found in the warm parts of Europe, Asia, and North America, very abundant in South Africa; they are principally extra-tropical.

The most general character of the order is acridity, but the seeds yield an oil which is useful for a variety of purposes. The bark of *Celastrus scandens*, a native plant, has considerable reputation in domestic practice as an emetic, discutient, and anti-syphilitic; it also appears to possess some narcotic powers. Riddell (*Syn. Fl.* 33) states that it is used by the Thomsonians as a stimulating diuretic, and considered capable of removing hepatic obstructions. The *C. senegalensis* has much the same properties, while the spines of *C. venenatus* are stated to cause the most painful wounds. Many species of *Evonymus* are also possessed of active

Fig. 112.

E. atropurpureus.

1. Petals. 2. Calyx. 3. Disk with stamens. 4. Stamen. 5. Ripe fruit. 6. Section of do. 7. Seed. 8, 9. Sections of do.

qualities; the bark of *E. atropurpureus* is used in the same manner as that of the *Celastrus;* those of *E. Americanus* and *E. obovatus*, as well as *E. Europæus*, have similar properties; the seeds of all are nauseous, purgative, and emetic, and are used in some places to destroy vermin in the hair; the leaves are poisonous to sheep and other animals feeding on them. The bark of *E. tingens* is of a beautiful yellow colour on the inside, and is used in India as a dye, and is also esteemed of benefit in diseases of the eyes.

The most striking of these plants is the *Catha edulis*, if the accounts of its properties be founded on fact; Forskäl (*Flor. Arab.* 63) says that he was informed that it is cultivated by the Arabs for the sake of its leaves, which they use in a green state, believing that they are powerfully anti-hypnotic, causing such extreme watchfulness, that a person remains awake all night without drowsiness; they also regard them as a perfect antidote to the plague, and that a person with some of them in his bosom may go among the infected with perfect impunity, and also that the disease never appears in places where the plant is cultivated. Botta states that in a fresh state these leaves are intoxicating. It should be noticed that Forskäl observes that there is nothing in the taste or odour of the leaves to indicate such potent qualities.

The *Maytenus chilensis* is considered in Chili as capable of relieving the poisonous effects of the *Laurus caustica* (Feuillée, *Plant. Med.* iii. 41). The root of *Myginda uragoga* is noticed by Jacquin as a powerful diuretic, and even lithontriptic (*Flor. Med. Antill.* iv. 81). The leaves of *Goupia glabra* are stated by Aublet to be employed in Guyana as applications to inflammations (*Guiane*, i. 297); and according to Roxburgh the bark of the root of *Elæodendron roxburghii* is used for the same purpose in India; it is a powerful astringent (*Cor. Plant*).

Order 42.—VITACEÆ.—*Jussieu.*

Calyx short, nearly entire. Corolla with 4—5 petals inserted on the outside of a hypogynous disk, inflexed in æstivation, deciduous. Stamens opposite, and as many as the petals. Anthers ovate, versatile. Ovary superior, 2-celled, with 2 erect collateral ovules in each cell. Style short, with a simple stigma. Fruit a pulpy berry, often from abortion 1-celled; 1—5-seeded. Seeds with a hard testa, and a cartilaginous, or fleshy albumen. Embryo shorter than the albumen. Radicle slender. Cotyledons lanceolate or subulate.

This very important order is composed of trailing or climbing shrubs, supporting themselves by tendrils growing in the place of racemes. The leaves are simple or digitate, the lower ones opposite, the upper alternate, opposite the racemes or tendrils. The flowers are greenish-yellow and small, usually arranged in racemes or thyrsoid panicles. The order contains but few genera; these are very closely allied to each other, and were formerly all included in that of Vitis.

Vitis.—*Linn.*

Calyx nearly entire. Petals 4—5, united at apex, distinct at base. Disk elevated in the centre, and bearing the stamens at base. Stamens five. Style short. Stigma dilated. Berry 1—4-seeded, cells and seeds often abortive.

It is wholly impossible, at the present day, to come to any correct conclusion as to the species of this variable genus. Either they must all be considered as varieties of one single kind, or they must be extended almost indefi-

nitely. Thus those inhabiting the United States differ less from each other than do many of the cultivated varieties of the *V. vinifera*, and they can hardly be distinguished from some of these, except that they are more uniformly polygamous. No less than 1400 varieties are said to be cultivated in the Luxembourg gardens at Paris; and Rafinesque has described 41 species of those peculiar to North America, and 60 of foreign origin, besides numerous varieties, and he states that Mr. Adlum, who paid much attention to the subject, stated that he had distinguished 200 varieties in a wild state in the United States.

V. VINIFERA, *Linn.*—Leaves lobed, sinuated, toothed, naked, or smooth.

Linn., *Sp. Pl.* 293; Woodville, 195; Stephenson and Churchill, *Med. Bot.* iii. 140; Rafinesque, *Med. Fl.* ii.

Common Name.—Grape Vine.

Foreign Name.—Vite, *It.*

Description.—It is so variable a shrub, that no description will apply to all the kinds. The leaves are more or less lobed, smooth, pubescent, or tomentose; are flat, crisped, or even plaited, either of a pale or of a dark green colour. The branches may be prostrate or climbing or erect, and tender or hard. The racemes are loose or compact, ovate or cylindrical. The fruit is white or pale, yellow, red, or purple; globose, ovate, or oblong in form; and sweet, musky, or austere in taste. The seeds are also variable in number, and sometimes by abortion are wholly wanting.

Fig. 113.

V. vinifera.

The early history of the Vine is involved in some obscurity, for the oldest of the profane writers that mention it, ascribe to it a fabulous origin. Its culture of course begun in the East, and we are told in Scripture, that Noah, after coming out of the ark, planted a vineyard, and "drunk of the wine and was drunken;" evidently showing that its properties were well known anterior to the deluge; though some commentators are of opinion that this was the first time that wine was made, and that Noah was therefore ignorant of its intoxicating properties. The traditions of ancient Egypt ascribe the first culture of the wine to Osiris, while in the Grecian mythology it is attributed to Bacchus. All accounts, however, point to the East as the first place in which the vine was reclaimed from its wild state, and became an object of culture. Dr. Sickler, who regards this useful plant as of Persian origin, has given a learned account of its migration to Egypt, Greece, and Sicily, from the latter of which countries it is supposed to have extended to Italy, Spain, and France. The Phocians are said to have carried it to the south of France, and the Romans to have planted it on the banks of the Rhine. It has been found that for the successful culture of the vine, the annual mean temperature should be between 50° and 63°, or the mean temperature may be as low as 48°, provided that of the summer reaches 68°. In Europe, these conditions are found to exist as far north as latitude 50°, but in the United States not

beyond 40°, on the eastern sea board, but at a somewhat higher latitude in the valley of the Mississippi. In both hemispheres the profitable cultivation of it ceases at about 30°, except in elevated situations or in islands. Thus the region of vineyards occupies about 20° in breadth in Europe, but not more than half that extent in the United States. In the southern hemisphere the observations have not been sufficient to ascertain whether the same rule will apply; though the Cape of Good Hope, where the vine flourishes, would seem to show that it is equally true in Africa. Ainslie states that the grape can be successfully grown in India, but that the climate precludes the making of wine.

The age to which the vine will attain is very great, and equals, if it does not surpass that of the oak. Pliny speaks of one which had existed for six hundred years, and Bose states that there are vines in Burgundy upwards of four hundred years of age. One growing in England, which was upwards of one hundred years old, covered one hundred and thirty-seven square yards with its branches, and measured four feet in circumference.

Grapes are usually distinguished by their colours and the shape of the berries, and have been variously classed by different authors. Besides their use as an article of diet, they have been prescribed medicinally; when ripe, they are wholesome, antiseptic and cooling, and when partaken of freely, somewhat diuretic and laxative, and have been found beneficial in many diseases. In a dried state they are termed *Raisins;* these are prepared either by cutting the stalks of bunches half through, and leaving them suspended to the vine until sufficiently dry, or by gathering them, dipping them into a weak ley, and then exposing them to the heat of the sun. What are termed *dried currants*, are the raisins of a small grape peculiar to some of the Grecian islands, particularly Zante. Raisins are more laxative than the fresh fruit, but are very apt to cause flatulence and colic. They are used in medicine, principally to impart a pleasant taste to certain pharmaceutical preparations, as some of the compound tinctures, &c.

At one time almost every part of the vine was recognised as officinal, and considered as possessed of remedial qualities, but are now generally disused; the leaves, tendrils, and young shoots contain malic and citric acids, and some bitartrate of potash; they are now principally employed in wine countries to flavour vinegar.

The juice of the grape consists of water, sugar, mucilage, glutinous matter, citric and malic acids, and tartrates of potassa. These principles, when left to themselves for a short time, undergo many important reactions, and their elements assume a new arrangement, and two new compounds are formed *wine* and *acetic acid.*

When the grapes are fully ripe, they are gathered for the manufacture of wine, and in most cases are, as soon as possible, subjected to pressure to separate the juice from the skin and seeds; for some wines, however, especially those of a rich and luscious character, they are permitted to become partially dried before gathering; this is practised in making the celebrated Tokay. Several modes are pursued to separate the juice, sometimes, as in Italy, the grapes are placed in perforated tubs over the vat, and trodden with the feet, or they are subjected to the action of a press in hair-cloth bags. The expressed fluid, or *must*, is then poured into a proper vessel and exposed to a temperature of at least 55° to enable it to commence the fermentative process. In a short time the liquor becomes turbid, its temperature increases, and the skins, seeds, and other impurities rise to the surface, and carbonic acid is generated. When this fermentation is over, the spongy crust which had formed at top, falls to the bottom, the fluid becomes clear, is found to have lost its former

character, and has become *wine*, or in other words, there has been the formation of alcohol. Where the juice contains too large a proportion of sugar, some tartar is added to it, and where the saccharine matter is deficient, sugar is added. It requires great attention and practical skill to manage the fermentation properly, as on this depends the quality of the wine. Almost every kind of wine requires a different treatment, and the same fruit is obliged to be managed differently in different seasons.

After this it is drawn off into casks, where a slow and almost imperceptible fermentation continues, with a loss in the quantity of the fluid, which loss must be supplied by the addition of other liquor. The result of this insensible fermentation is a gradual increase in the quantity of alcohol, and the deposit of the tartar, which collects on the sides of the cask, mixed with the colouring matters of the juice. A variety of modes are adopted at this period of the process to give the different wines their peculiar characters and strength; these differ not only with the kinds of wine, but with the product of every vineyard, for the odour and flavour of wines depend not only on cultivation and soil, but also on the methods of conducting the fermentation in its different stages; though it is also certain that the same grape, in the same climate, soil, and mode of treatment, will produce wines of very various qualities. Position and aspect have much influence, for the product of two adjoining vineyards, but differing in exposure, are widely dissimilar.

The quality and flavour of the fully fermented wines depend principally on the method of conducting the fermentation; but the sweet and half fermented wines derive their taste more immediately from the grape. Thus Madeira, Sherry, Marsala, and Port, are dry and strong; Malaga, Tokay, Tinto, Montefiascone, &c., are sweet, and contain sugar from the fermentation being imperfect. Champagne, and other sparkling wines, owe their briskness to the presence of carbonic acid; whilst Hock, and the Rhenish wines generally, and many of the French, contain much uncombined acid. The roughness and flavour of the red wines are usually derived from the husks of the fruit, but are often artificially communicated to them by the addition of astringents, as rhatany, kino, &c. The tints of wines are either natural or communicated by the addition of various matters, and the strength is constantly augmented by the addition of brandy.

It would require a volume to notice, even in a brief manner, the varieties of wine, and their supposed excellencies and demerits. It may be sufficient to say, that whatever may be their differences, the essential constituents are the same, though the relative quantities of each, vary with the kind of wine. Wine contains alcohol, an odorous principle generally supposed to be a volatile oil, colouring matter derived from the husk, tannin, bitter extractive, sugar, gum, ferment, acetic acid, malic acid, tartaric acid, bitartrate of potassa, bitartrate of lime, other salts of lime and carbonic acid. The quantity of alcohol varies exceedingly; from 9 to 25 per cent. according to Brande, and from 7 to 17 per cent. according to Christison. (See Carson's edition of Pereira's *Elements of Mat. Med.*, ii. 645.)

Medical Properties, &c.—Wine is stimulant and tonic. In moderate quantities it excites the energies of the system, promotes digestion, quickens the action of the heart and arteries, increases the secretions, enlivens the senses, awakens the passions, and improves the intellectual powers. But as these are the result of an artificial stimulation, its habitual use in a state of health must prove injurious, by exhausting the vital powers, to a degree commensurate to the quantity and quality taken, and to the condition of the system, and its susceptibility to the action of alcohol. When taken to excess it intoxicates, with its degrading consequences. Its habitual and long-continued use even in moderation, is equally destructive to mind and body, producing dys-

pepsia, hypochondriasis, hepatic disease, gout, apoplexy, and a long and frightful catalogue of other ills.

It should be noticed that the action of wine upon the system, though mainly dependent on the alcohol contained in it, differs in many respects from that of the latter; its stimulant operation is less sudden and more durable, and hence may be considered as more tonic. Nor is the intoxicating effect of wine in exact proportion to the proportion of alcohol it contains, nor to that of a mixture of alcohol and water of corresponding strength. Thus eight fluid ounces of brandy contain about four ounces of alcohol, whilst 18 ounces of Port wine contain the same. Thus a pint of wine should be as intoxicating as half a pint of brandy, which is well known not to be the case. It is possible that this difference of action is owing to a modifying influence exercised by the other constituents of the wine. The after results of an habitual use of distilled spirits and wine are also different; thus diseases of the liver are frequently caused by the use of ardent spirits and are seldom produced by an indulgence in wine.

The chief medicinal employment of wine is as a stimulant and tonic in fevers of a low grade, or to obviate symptoms arising from exhaustion and debility, and to rouse the energies of the system. In these cases it has proved highly beneficial, as its powers can be regulated with ease and certainty, whilst it is generally grateful to the patient. The quantity to be administered is dependent on the state of the system. The object to be attained is to afford such stimulus as is required, and at the same time to avoid any excess that may occasion a subsequent exhaustion. It must therefore be regulated by the effects it produces, advantage being derived from it when it renders the pulse more slow and firm, where irritation is lessened, delirium removed and sleep induced. On the other hand, if the pulse be quickened, restlessness induced, thirst excited, and the heat of body and delirium increased, it is obviously injurious, and must be relinquished.

Group XVI.—Polygalales.

Order 43.—POLYGALACEÆ.—*Lindley.*

Sepals 5, often irregular and unequal; 3 exterior and smaller, (1 superior, and 2 inferior,) and 2 interior. Petals hypogynous, usually 3, deciduous, 1 anterior and larger than the other two, which are alternate with the upper and lateral sepals, sometimes united at base; or when 5, the two additional ones are very small. Stamens 6—8, united by the anthers into 2 fasciculi; anthers innate, 1-celled, opening at the apex. Ovary compressed, 2-celled, each cell with one pendulous ovule, (rarely 2—6); style and stigma simple. Pericarp an indehiscent small capsule. Seed pendulous with a fleshy albumen.

The plants in this small order are herbaceous, as is the case with all the North American species, or shrubby. They have alternate, entire leaves, without stipules, often verticillate at the lower part of the stem. The flowers are generally small, and in racemes or terminal spikes. The roots are bitter and sometimes milky. They are found in most parts of the world. The properties of the different species are various. Some are bitter and tonic; this is the case with several species of *Polygala*, as *P. amara*, *vulgaris*, *rubella*, *&c.*, and particularly with the *Soulamea amara*, called by Rumphius "rex amaroris." This plant is used in some parts of the East Indies with great success in cholera, and is regarded as a most valuable febrifuge. Some are emetic, purgative and diuretic, of which the most important is the *P. senega*, though some others participate in these qualities. Some have merely emetic properties, as the *P. poaya*, and others. Some are diuretic and sudorific, as the *P. thesioides* and the *Bardiera diversifolia*, and finally some are poisonous, as in *P. venenosa*, of Java.

Others again appear to have saponaceous qualities, the bark of several species of *Monnina* being used as a substitute for soap, and is also said to be efficacious in bowel diseases.

Polygala.—*Linn.*

Sepals persistent; the interior wing-like. Petals 3, their claws adnate to the stamineal tube, the inferior one carinate. Ovary 2-celled, ovules solitary in each cell. Pericarp compressed, obovate, obcordate or elliptical. Seeds pubescent, carunculate.

This very extensive genus consists of herbaceous and shrubby species, which are found in all quarters of the globe, but most numerous in America and southern Africa. The name is derived from two Greek words, signifying *much milk*, from an idea entertained by the ancients, that cows feeding on these plants had an increased secretion of that fluid. Many of the species have been used medicinally, as tonics, expectorants, and diuretics, and all of them are endowed more or less with these qualities.

P. Senega, *Linn.*—Stems numerous, simple; leaves lanceolate, with scabrous margins. Racemes spiked. Flowers on very short pedicels, wings orbicular-ovate. Capsule nearly orbicular.

Torrey and Gray, *Fl.* i. 131; Bigelow, *Med. Bot.* ii. 97; Barton, *Veg. Mat. Med.* ii. 111; Stephenson and Churchill, ii. 103.

Common Names.—Seneka snake root; Rattlesnake root; Senega rattlesnake root.

Foreign Names.—Polygale de Virginie, Senega, *Fr.;* Senegawurz, Klapperschlangenwurz, *Ger.;* Poligala virginiana, *It.*

Description.—The root is contorted, ligneous, branching, and perennial. Stems annual, numerous, simple, erect, somewhat terete, of a brownish-red below and green above, about a foot in height. The leaves are alternate, lanceolate, acuminate, and scabrous at their margin. The flowers are in a somewhat dense, terminal spike, of a greenish-white or reddish colour. The sepals are all obtuse. The petals are small, with the crest small and the lateral segments obtuse. The style is short, somewhat rostrate. The capsule is obcordate, invested by the persistent calyx, and containing two, oblong-ovate, slightly hairy seeds, of a blackish colour.

Fig. 114.

P. senega.
1. Detached flower. 2. Keel with stamens adhering. 3. A seed.

The Seneka snakeroot is found in most parts of the United States, but is most abundant to the south and west; it generally grows on hill sides and in dry woods, flowering from June to August, the spike opening gradually, so that it often presents seed at the lower part, whilst the upper flowers have not expanded. The root, which is the officinal portion of the plant, as found in commerce, varies in size from the thickness of a quill to that of the little finger. It is much contorted, and presents a tuberous head, with the remains

of the stem, below which is the tapering, corrugated root, of a yellowish-brown or brownish-gray colour. This part of the root is marked with a ridge or carina throughout its length, and with more or less numerous rings or projections. The cortical portion is thick, resinous, and of a grayish-yellow colour; the central woody part is white. The active qualities of the root reside wholly in the bark, the woody fibre being wholly inert.

Seneka root has a peculiar, but nauseous smell; the taste is at first mucilaginous and somewhat sweetish, but afterwards becomes acrid and irritating, acting powerfully on the mouth and fauces. It imparts its properties to water and alcohol, but most fully to the latter.

Medical Properties, &c.—The remedial qualities of Seneka are very various; it has been successfully employed as an emetic, a stimulant, an expectorant, a sudorific, a diuretic, and in fact to fulfil almost every indication. Dr. Chapman speaks of it as an emmenagogue, expectorant, and diuretic; and Dr. Cullen classes it among the purgatives. It was in use among the Indians as an antidote against the bites of venomous snakes, and was considered by them as most decided in its effects. It was first introduced to the notice of the profession by Dr. Tennant, about a hundred years since, in the treatment of diseases of the respiratory organs, and has since maintained a high rank as an expectorant, especially in croup, in which its curative powers were thought by some practitioners as almost certain; but it is seldom used in this complaint at present, except in the form of hive syrup, which excellent combination is one of the best adjuvants in the treatment of that fatal disease. Dr. Archer gave it in a strong decoction, in teaspoonful doses, until an impression was made on the disease. The emmenagogue powers of the Seneka were first pointed out by Dr. Hartshorne; and it has been found highly useful in recent cases of amenorrhœa, but is seldom beneficial in those of long standing. Dr. W. P. C. Barton recommends a trial of it in hydrophobia, under an impression that from its powerful action on the larynx and trachea, it might prove beneficial; no fair trial has been made of it in this terrible disease, but it is worthy of attention, for if it did not cure, it might at least alleviate the sufferings of the patient.

Several analyses have been made of the Seneka, the most recent of which is that of Quevenne (*Journ. de Pharm.* xxii.) This chemist states that it contains two peculiar acids, the Polygalic and the Virgineic, on which its properties depend. The first of these acids was discovered by Peschier of Geneva, who also noticed another principle in it, which he termed *isolysine;* this latter was not detected by later experimenters, but is probably an impure form of the Virgineic acid of Quevenne.

Seneka is given in powder, in doses of 10 to 20 grains; in decoction, from an ounce to two ounces. An extract has also been prepared from it, which is much used in France, but is scarcely if ever employed in this country (*Am. Journ. Pharm.* xiv. 287), which appears to possess all the properties of the root in a concentrated form.

Several other species of Polygala have been recommended as remedial agents, both as substitutes for the Seneka, and as simple tonics. Thus the *P. sanguinea* is said by Dr. B. S. Barton to possess the same properties as the *P. senega;* and Peschier states that the *P. chamæbuxus* is identical in composition with it, and may be used in all cases as a substitute. On the other hand, the *P. amara*, the *P. rubella*, and the *P. vulgaris*, are powerful bitters when given in small doses, but cathartic and diaphoretic when freely administered.

Fig. 115.

P. paucifolia.

Rafinesque says that *P. paucifolia*, found in many parts of the United States, is possessed of active properties. That the whole plant, but especially the root, has a sweet, pungent aromatic taste, somewhat resembling that of Gaultheria. Its properties, he goes on to state, are similar to it and *P. senega*, being stimulant, sudorific, expectorant, &c., but is milder in its action than the latter plant, and may therefore be employed where this is contra-indicated. It may be used in warm infusion and decoction. Our own observations do not agree with these; the root appearing rather to have the properties of a tonic and bitter similar to those of the *P. amara* and *P. rubella*, than those of Seneka.

Some species, again, act principally on the stomach; thus the *P. poaya*, a native of Brazil, is used as an emetic, and is one of the false ipecacuanhas; it is spoken of by Martius, under the name of the White ipecacuanha of St. Paul (*Journ. Phil. Coll. Pharm.*, iii. 195). Nor are some of these plants destitute of still more powerful qualities; as Commerson states that the *P. venenosa* of Java is eminently poisonous, so much so, indeed, that from merely touching the leaves he experienced nausea and long-continued sneezing.

Krameria.—*Lœfling.*

Sepals 4—5, irregular, coloured, deciduous. Petals 4—5, hypogynous, smaller than the sepals; two or three superior ones unguiculate; two lower ones small, scale-like. Stamens 4, hypogynous, unequal. Ovary 1-celled; style terminal, stigma simple; ovules 2, pendulous. Pericarp between woody and leathery, round, indehiscent, 2-seeded. Seed roundish-ovate, albumen none.

This genus, which has been formed into a sub-order, consists of spreading, or procumbent, small, shrubby plants, much branched from the base, with alternate, simple, entire leaves, which, with the branches, are usually hairy. The roots of all the species are astringent and bitter. They are mostly natives of the warmer parts of the American continent, one species only having been discovered in North America.

K. triandra, *Ruiz & Pavon.*—Leaves oblong, ovate, somewhat pointed, villous. Pedicels somewhat longer than the leaf. Stamens 3.

Ruiz & Pavon, *Fl. Peruv.* i. 93; Churchill & Stephenson, *Med. Bot.* ii. 72; Lindley, *Flor. Med.*.128; Carson, *Illust.* t. 13.

Common Name.—Rhatany.

Foreign Names.—Ratanhie, *Fr.;* Ruiz para los dientes, *Sp.*

Description.—Roots long, spreading, of a blackish-red colour externally, red internally, styptic, bitter. Stem procumbent, suffruticose, divided into numerous spreading branches, which are white and silky when young, but black and naked when old. The leaves are scattered, sessile, oblong-ovate, and somewhat acute, covered on both surfaces with silky hairs. The flowers are terminal, solitary, and borne on short footstalks. The calyx consists of four red sepals, the inferior largest, hairy externally, but smooth on the inner surface. The corolla is formed of four petals, the two smaller being sessile, and the larger and superior unguiculate. The stamens are 3, hypogynous, with small, urceolate anthers, having two openings at their apex. The ovary is ovate, supporting a small red style, crowned with a simple stigma. The fruit is a dry, globose berry or drupe, covered with stiff, reddish hairs.

Fig. 116.

K. triandra.

This plant presents one of those anomalies so often met with, of one or more species of a genus having a different number of sexual organs than the others; in Krameria, the usual number of stamens is four or five, whilst in this species they are but three. It is a native of many parts of Peru, usually growing in a dry sandy soil on the sides of mountains. It was discovered by Ruiz in 1780, but had long been known to the natives as a powerful astringent. It flowers throughout the year, but most freely in the autumn. It is collected in large quantities, and the roots exported after being well dried, or an extract prepared from them, which, as well as the root, is exported to Portugal, where they are used to adulterate red wines. It was first made known to the medical profession by Dr. Reece of London, who, having learnt that it was employed in Spain and Portugal as above stated, was induced in 1808, to institute some experiments with a parcel of the root, sold in London as part of a prize cargo. In consequence of his eulogies of it, it became a favourite remedy, and was admitted as officinal in all the Pharmacopœias.

The root as found in commerce, consists of woody, cylindrical pieces, from the thickness of a goose-quill to twice that size. It has a somewhat fibrous, ferruginous-coloured bark, of an intensely astringent and slightly bitter taste. The ligneous part is tough and fibrous, and is somewhat mucilaginous on being chewed. It imparts its properties to both cold and boiling water, but more fully to alcohol.

Medical Properties, &c.—Rhatany being a powerful astringent and tonic, has been found useful in checking profuse discharges, and in giving tone to the system. Dr. Perceval has spoken highly of a solution of the extract in a camphorated mixture in the advanced stages of typhus fever, and it has been

much lauded in the treatment of fluor albus and menorrhagia. When taken into the stomach, it tinges the fæcal evacuations of a red colour, but does not affect the colour of the urine, though it diminishes the quantity of this secretion. The powdered extract forms an ingredient in many tooth-powders, and the tincture is also used as an astringent mouth wash. Several preparations are officinal in the U. S. Pharmacopœia, as the infusion, the extract, the tincture, and the syrup; this latter form is an excellent mode of administering it, and has been found very efficacious in all the cases to which Rhatany is applicable; the dose is from a drachm to half an ounce; of the extract from ten grains to a scruple; the compound tincture, which is much employed in France as a stomachic in cardialgia, nervous irritability, &c., is made as follows: ℞.—Rad. Kramer. contus. 3iij., Cort. aurant. 3ij., Rad. Serpent. Virgin. 3ss., Croci. Ang. 3j., Alcohol, ℔ij.

Rhatany has been analyzed by several chemists, and is shown to owe its powers to the presence of a large proportion of tannin, 100 parts of the root affording about 32 of watery extract, which is composed of nearly one half of tannin. Peschier also detected a peculiar acid, to which he has given the name of Krameric, and is of opinion that the styptic properties of the root are dependent on it.

The *K. ixina* found in the West Indies and Brazil, is said to possess identical properties with the Rhatany, and is admitted as officinal into the French Codex, but is seldom or ever employed. It is highly probable also that the North American species, the *K. lanceolata*, Torrey, might be used as a substitute for the Peruvian should it be required.

Monnina.—*Ruiz and Pavon.*

Flowers resupinate. Sepals 5, deciduous; the 2 inner wing-like; the 3 outer ovate, two of them often connate. Petals connate at base, often three-toothed. Stamens 8; filaments somewhat diadelphous. Drupe 2-celled, 2-seeded, or by abortion, 1-celled, 1-seeded. Seed pendulous.

These are herbaceous or suffruticose plants, peculiar to South America, and long known in Peru, under the name of "yallhoy." The roots of *M. polystachya* and *M. pterocarpa* are much esteemed for their powers in the treatment of bowel diseases. They are bitter and astringent, but also contain a saponaceous principle, for if the bark be agitated in water it causes a frothing like soap, and its detergent properties are said to be very active, hence it is employed by the silversmiths in Peru to cleanse and polish wrought silver. The *M. salicifolia* has somewhat the same powers, but is principally used in cold infusion for the purpose of cleansing and strengthening the hair.

Group XVII.—Leguminales.

Order 44.—FABACEÆ.—*Lindley.*

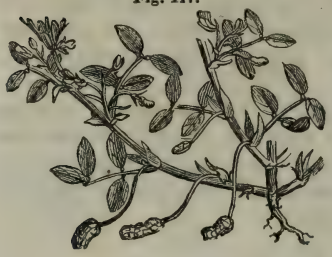
Sepals united into a 5-cleft or 5-toothed calyx, the segments often combined, the odd one inferior. Petals 5, perigynous or hypogynous, irregular and unequal, or regular, distinct or cohering, the odd petal superior. Stamens definite or indefinite, distinct, monadelphous or diadelphous, inserted with the petals; anthers versatile. Ovary solitary, distinct from the calyx; ovules one or several, style simple. Fruit a legume or a drupe. Seeds solitary or many, sometimes with an aril or large caruncle, exalbuminous. Embryo straight, or with the radicle bent back along the edge of the cotyledons; cotyledons thick and fleshy, or thin and somewhat foliaceous.

This extremely extensive order is composed of trees, shrubs, and herbs. The leaves are alternate, stipulate, usually compound, sometimes reduced to

a single leaflet, the margins of leaves are in almost every instance entire. The flowers are solitary, in racemes or panicles, usually with articulated peduncles and often with two bracts under each flower. The order has been divided into several sub-orders, and many tribes and sub-tribes. The most common feature of all, is to have what are called papilionaceous flowers, and where these are present, no mistake can arise, as they exist in no other order. Another is to have leguminous fruit, and by one of these two characters they may all be recognised, though one or other disappears in many cases. In a medicinal point of view, although it is one of the most important of the orders, no general character can be assigned to it, as remedial agents of all kinds are afforded by its species.

Sub-order 1. PAPILIONACEÆ.—Corolla papilionaceous; stamens usually diadelphous. Flowers mostly perfect.

Fig. 117.



Arachis hypogæa.

This division contains most of the plants of the order with nutritive or at least wholesome seeds, among which the numerous kinds of peas and beans are the best known and most generally employed, but even among these, some are unwholesome and even poisonous, as for instance the *Lathyrus aphaca*, the seeds of which when mature, are somewhat narcotic and produce headache, though when green they can be eaten with impunity. Some of these seeds contain much oil; this is the case with the *Arachis hypogæa*. Nor are the nutritious or edible properties confined to the fruit; the roots of *Glycirrhiza glabra* and others of the genus, contain much mucilaginous saccharine juice. Those of several species of *Dolichos*, *Apios*, &c., are wholesome food. A kind of manna is produced in Persia and the adjoining countries from a species of *Alhagi*.

But marked medicinal qualities also exist in a great number of these plants. Some are purgative, for example, the leaves of *Colutea arborescens*, of several species of *Coronilla*, *Genista*, *Cytisus*, &c. The roots of *Tephrosia senna* are purgative, and those of *T. virginica* also anthelmintic. Others are diuretic, as the roots of *Genista*, *Ononis*, &c., whilst the young shoots of *Cytisus scoparius* are both purgative and diuretic. The roots and leaves of *Baptisia tinctoria* are both emetic and purgative.

Fig. 118.

Butea frondosa.

Some again are tonic and astringent, thus the African kino is the product of *Pterocarpus erinaceus*, and *P. marsupium* furnishes the East Indian, whilst dragon's blood is obtained from *P. draco*. Several others of these plants furnish similar resins, as some species of *Butea*, *Dalbergia*, &c. A few produce gum, for instance, Tragacanth exudes from many species of *Astragalus*, and others afford dyes, as Indigo is derived from various species of *Indigofera*, *Tephrosia*, *Baptisia*, &c., and yellow tints are obtained from *Genista tinctoria*, the flowers of *Butea frondosa* and others.

Nor are narcotic qualities wanting; the seeds of *Abrus precatorius* are acro-narcotic, according to most authorities, though this is denied by Dr.

Macfadyen (*Flor. Jam.*) The bark of the root of *Piscidia erythrina* is a usual fish poison in Jamaica, and yields a highly narcotic and diaphoretic tincture. Several of the *Tephrosias* have the same qualities. The barks of *Andira* and *Geoffroya* are anthelmintic, purgative, and narcotic. The seeds of *Ervum ervilia* are said to cause loss of power in the limbs, almost amounting to paralysis.

A variety of other indications are fulfilled by many of these plants, for instance, the hair of the pods of *Mucuna pruriens* is anthelmintic, and an infusion of the root is in much repute in India in cholera. *Euchresta Horsfieldii* is esteemed by the Javanese as a specific against poisons of all kinds. The leaves of the *Indigofera anil* are used in India in hepatitis, and a decoction of the root of *Tephrosia purpurea* considered efficacious in dyspepsia and tympanitis.

In addition to all this, a great number of species are employed in the arts. Some of them furnish a strong fibre used as a substitute for hemp, thus the *Crotalaria juncea* affords the material, from which gunny bags are made. The *Dipterix odorata* bears the aromatic seed known under the name of Tonka, so much used to scent snuff. Several species of *Melilotus* are used to flavour Chapziger cheese. Several afford timber of excellent quality, as the *Robinia pseudacacia* or locust, some species of *Dalbergia*, &c. But it would be an almost endless task to enumerate all the qualities and uses of the numerous plants of this sub-order.

Baptisia.—*Ventenat.*

Calyx bilabiate, 4 cleft. Corolla papilionaceous, petals many, equal, vexillum reflected laterally. Stamina 10, unequal, free. Legume ventricose, many-seeded.

The species composing this genus were formerly included in *Sophora*, by Linnæus; in *Podalyria*, by Michaux, and others; but finally erected into a distinct one by Ventenat. They are all perennial plants, and natives of North America, and are twelve or fourteen in number, generally with yellow, but in some cases with white or blue flowers.

B. tinctoria, *R. Brown.*—Glabrous, much branched, leaves nearly sessile, ternate, leaflets obovate, or cuneiform; racemes terminal, few-flowered; legumes ovate on long pedicels.

Brown, *Hort. Kew.* iii. 6; Torrey and Gray, *Fl.* i. 386; Barton, *Veg. Mat. Med.* ii. 53; Rafinesque, *Med. Fl.* i. 79; Lindley, *Flor. Med.* 237; *Sophora tinctoria*, Linn. *Spl. Pl.* 584; *Podalyria tinctoria*, Willdenow, *Sp. Fl.* ii. 503.

Common Names.—Wild Indigo; Horsefly weed; Rattle bush, &c.

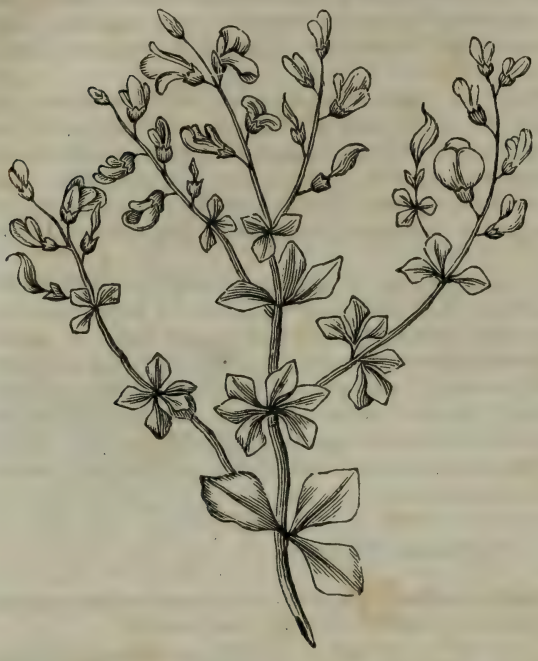
Foreign Names.—Indigo trefle, *Fr.*; Farbende Baptisia, *Ger.*

Description.—Root perennial, large and woody, very irregular, blackish externally, and yellowish within, with numerous, lighter-coloured radicles. Stem two or three feet high, round, yellowish-green, smooth, marked with black dots, much branched; branches slender, and of a yellowish colour. Leaves alternate, small, formed of three sessile, obovate, smooth, bluish-green leaflets, with minute, evanescent stipules. Flowers yellow, in small, loose spikes at the ends of the branches. Calyx campanulate, bilabiate, upper lip entire or emarginate, lower trifid. Stamina included, deciduous. Ovary stipitate, bearing a minute stigma. Legume bluish-black, inflated, oblong, with a row of small seeds.

The Wild Indigo is shrub-like, and is found in most parts of the United States in dry situations, though sometimes to be met with in marshy, low ground. It flowers in July and August, when its bright yellow blossoms ren-

der it very conspicuous. The whole plant becomes black when dried, and affords a blue dye resembling Indigo, but very inferior to that article. From its being so generally used to drive away flies from horses by being attached to their harness, it has derived one of its common names. If it really be more obnoxious to flies than any other plant, which is at least doubtful, it is probably owing to its narcotic and unpleasant smell. The young shoots are used in some parts of the country as a substitute for asparagus, which they somewhat resemble. Like another substitute for that vegetable, the young poke, they sometimes act as a drastic purgative, particularly if used after they begin to assume a green colour.

Fig. 119.



B. tinctoria.

Medical Properties, &c.—The whole plant, but more especially the root, is subacrid and nauseous. It is actively emetic and purgative when fresh, but loses much of its power when dried. It has attracted but little attention from the profession; but from the testimony of those who have made trial of it, appears worthy of notice. Dr. Thacher (*Dispensatory*), says: "In the hands of some physicians it is found to operate, in a large dose, with much severity as an emetic and cathartic. A decoction of the bark of the root has, it is said, been made known by an empiric, experienced in its use, as a remedy in scarlatina anginosa, and its employment has been extended in a few instances to typhus or putrid fever with such good effect as to encourage further trials. An experienced physician considers it as an excellent antiseptic and febrifuge, preferring it in some fevers to Peruvian bark." He then goes on to speak of it as an external application to foul ulcers, aphthæ, mercurial sore mouth, &c., in which he states that it has proved eminently beneficial. This high character of the Baptisia is fully corroborated by Dr. Comstock (*Eclectic Repertory*, vi.), not only in the conditions of the system noticed by Dr. Thacher, but also in others of a still more morbid nature, as gangrene and mortification, which he says it arrests with promptitude and power. Dr. Barton (*Veg. Mat. Med.*), corroborates these statements, as respects its good effects, as a sub-astringent antiseptic in correcting the vitiated discharges from foul and gangrenous ulcers, and checking the progress of mortification, when used simultaneously with the internal administration of Peruvian bark.

It is given internally in decoction made with an ounce of the recent root to a pint of boiling water; the dose is about a tablespoonful every three or four hours; if it acts on the bowels, the quantity must be diminished, or laudanum be given with it. An ointment made by simmering the fresh root in lard, has been found beneficial in burns and ulcers.

Cytisus.—*Linn.*

Calyx bilabiate, upper lip entire, lower three-toothed. Vexillum ovate, large; carina obtuse. Stamens monadelphous. Legume flat, many-sceded, glandless.

This genus derives its name from the island of *Cithisus*, where several of the species are found. The plant so designated by the ancients, and especially noticed by Virgil, as augmenting the milk of goats, is considered to be a species of Medicago. All the species are shrubs, generally with ternate leaves, yellow flowers, and destitute of spines.

C. scoparius, *Link.*—Leaves oblong, ternate, upper ones solitary. Branches angular' unarmed. Flowers axillary, peduncles short. Legume fringed.

Link, *Enum.* ii. 241; Lindley, *Fl. Med.* 239; *Spartium scoparium*, Linn. *Sp. Pl.* 996; Stephenson and Churchill, ii. 67; *Eng. Bot.* 1339.

Common Names.—Broom; Common broom.

Foreign Names.—Genet à balais, *Fr.;* Genista, *It.;* Pfriemenkraut, *Ger.*

The Broom is a native of many parts of Europe, and grows on dry and sandy soils, flowering in May and June. The flower buds are sometimes pickled as a substitute for capers. The young branches are often mixed with hops in brewing, and are still more used for brooms; and according to Woodville, the seeds have been used as a substitute for coffee; but from the suspicious character of the seeds of this genus, they can by no means be devoid of active properties.

Medical Properties, &c.—The parts used in medicine are the tops of the shoots or branches; these have long enjoyed a reputation as emetic, cathartic, and especially as diuretic, and were at one time in very general use both in regular and domestic practice. Dr. Cullen speaks of a decoction of them in dropsy, in very high terms, and states that he never failed in a single instance with it, in causing an increased action of the kidneys. It, however, was overlooked in favour of other remedies, until its use was again revived in consequence of its having been prescribed with much benefit to the Duke of York some years since. It is said to be peculiarly useful in dropsy of the thorax, combined with disease of the lungs. The mode of administration is in decoction made with an ounce of the green tops, boiled in a pint and a half of water down to a pint, of which a teacupful is given every hour till it produces some effect. It may also be administered in the form of a powder of the seeds, the dose of which is from ten to fifteen grains, to be aided by the free use of diluents. There does not appear to have been any analysis of this plant, but it is probable that it contains the same active principle as the *C. laburnum*, viz. *Cytisine*, an energetic substance which has been detected in plants of very different orders.

This plant has often been confounded with the plant called Broom, the *Spartium junceum*, as they resemble each other in many particulars, both in appearance and medical properties. Another species of Cytisus has attracted some attention from the poisonous nature of its seeds, this is the *C. laburnum*, so well known as an ornamental shrub in gardens. The leaves and young shoots are emetic and purgative, and the seeds emetic and acro-narcotic, and have been productive of several serious accidents.

They owe these properties to the presence of *Cytisine*, which appears to act with much power on the cerebro-spinal system.

Indigofera.—*Linn.*

Calyx 5-cleft, lobes obtuse. Vexillum roundish, emarginate. Carina on either side, near the base, producing a subulate, spreading spur. Stamens diadelphous. Legume linear, rather small, terete or quadrangular.

This vast genus, of upwards of a hundred species, is composed of herbaceous and suffruticose plants, with simple or pinnate leaves, furnished with small stipules. They are all more or less tomentose or hirsute, and have purple, blue, or white flowers. The greatest number of them are natives of Africa and India; a few are indigenous to the United States. Many of them furnish a peculiar product, well known as Indigo, the preparation of which was known to the aborigines of this continent at the time of the discovery; and it is remarkable, as is observed by Sonnini, that *Nil* or *anil* is one of the American names for the Indigo plant, which is also called *Nili* by the Arabs. Although many species furnish Indigo, the best, or Bengal, is procured from the *I. tinctoria*.

I. tinctoria, *Linn.*—Leaflets 4—5 pairs, ovate, somewhat pubescent beneath; racemes shorter than the leaves; legumes terete, arcuated, deflexed.

Linn., *Sp. Pl.* 1061; Lam., *Dict.* iii. 245; Lindley, *Fl. Med.* 242; De Candolle, *Prod.* ii. 224.

Common Name.—Indigo Plant.

Foreign Name.—Indigotier, *Fr.*

Fig. 120.

I. tinctoria.

Description.—A shrub about two feet in height, with spreading, sub-flexuose branches, which are angulose, and appressed-puberulous near their extremities. Leaves pinnate. Leaflets 4—5 pair, with an odd one, petiolated, elliptic, acute at base, mucronate at tip, with an appressed pubescence beneath. Stipules small and subulate. Racemes axillary, not as long as the leaves. Flowers pedicellate, with minute subulate bracts. Calyx 5-toothed, the two upper wider apart than the others. Flowers of a greenish colour, marked with vermilion red. Standard ovate, mucronate, minutely ciliate, and pubescent externally. Wings shorter than the keel, which is concave, greenish, minutely ciliated. Legume more than an inch in length, arcuated, terete, pubescent, containing ten seeds.

Several species of Indigofera are cultivated, but the *I. tinctoria* is that grown in India and very extensively in South America, the Guatimala plant, *I. disperma*, being considered by De Candolle as a variety of it. Besides this, the *I. anil*, *I. caroliniana*, and *I. argentia*, are also used, the two latter in the United States. The *I. tinctoria* abounds most in colouring principles, and is therefore the one generally selected for cultivation.

Indigo is a rich blue substance, light and friable, tasteless, almost devoid of smell, of a smooth fracture, insoluble in water or alcohol, but dissolved by sulphuric or nitric acid. It consists of indigotin, or indigo blue, indigo brown, indigo red, and a gelatinous substance. It is procured in three different modes; by fermentation, which was the most general plan, by scalding, and by the dry process; which latter is becoming much used in India, and is said to afford the best product, whilst it is not so injurious to the health of those engaged in the manufacture. (See *Encyclop. Amer.*, Art. *Indigo.*) In what-

ever way Indigo is procured, a certain degree of fermentation appears necessary, as it does not appear to exist in the leaves, and is therefore rather a product than an educt.

The mode of preparing it, and of applying it to the purposes of dyeing, seem to have been known in India from the earliest ages, and it is noticed by Dioscorides and Pliny, though the term *Indicum* was also applied to other colouring substances. Its use was likewise known to the Mexicans and other American natives, long anterior to the conquest. As early as the fifteenth century the Venetians were in the habit of receiving it from India, by the way of Egypt; but it was not generally employed in Europe until about the middle of the sixteenth century, when it was brought from the East Indies by the Dutch. When it was thus introduced, there was a great prejudice against it, and it was considered to be a kind of stone; it was prohibited in England by Elizabeth, and in Saxony by the Elector, who speaks of it in his edict as a corrosive substance, and food fit only for the devil.

The best Indigo is of a deep-blue colour, inclining to violet, of a smooth grain, and bright and sparkling when broken. It should break easily, swim in water, and burn freely, leaving but little residue.

Medical Uses, &c.—A decoction of the root, used as a lotion, effectually destroys vermin, and is much used for that purpose in Jamaica. The juice of the young branches, mixed with honey, is recommended as an application in the aphthous sore mouth in children, and Indigo sprinkled over foul ulcers is said to cleanse them (Macfadyen, *Flor. Jam.*, i. 251). The leaves are supposed to have virtue in hepatitis, given in the form of powder mixed with honey, and a decoction of the root is reckoned as alexipharmic. (Ainslie, *Mat. Ind.*, i. 179.)

Indigo itself has been employed for a long time. The Romans ascribed extraordinary virtues to it; "rigores et impetus sedat et siccat ulcera," (*Plin.*, lib. xxxv. c. vi.) It was employed at one time as an astringent, in immoderate discharges of the lochia, and for curing a prolapsus of the uterus or rectum. (James, *Pharm. Univer.*, 345.) Of late years it has attained some celebrity in the treatment of spasmodic diseases, especially epilepsy, in which it is stated to have been very successful in numerous cases, in Germany. The trials made with it in England and this country have not been attended with the same good results (Dunglison, *New Rem.*, 361). To produce any effect the doses must be as large as the stomach can bear, beginning with a few grains and increasing. The best form of exhibition is in an electuary of one part of Indigo to two of syrup. According to Roth (*Pereira*, ii. 610) it produces the following effects. "Shortly after taking it the patient experiences a sense of constriction at the fauces, and an impression of a metallic taste on the tongue. This is followed by nausea, and frequently by vomiting. In some persons the vomiting is so violent as to prevent any further use of the remedy. When it has subsided, a diarrhœa, often accompanied with cardialgia, ensues; the stools are frequent, liquid, and of a blue colour. Dyspepsia and vertigo sometimes occur. The urine becomes of a dark-brown or violet colour. After its use for some time, spasmodic twitchings of the muscles sometimes take place."

This article, however, appears to be possessed of very little power, as most persons can take it in very large doses; two ounces having been administered daily for a length of time without producing any very manifest effect, except a derangement of the digestive apparatus.

Glycyrrhiza.—*Linn.*

Calyx tubular, naked, bilabiate; upper lip 3-cleft, lower entire. Carina 2-parted. Legume ovate, compressed.

This genus consists of perennial, herbaceous plants, generally with roots having a sweet taste. The flowers in axillary racemes, and of a blue, violet, or white colour. They are natives of the south of Europe, Tartary, the countries bordering on the Levant, and North America.

G. glabra, *Linn.*—Legumes smooth. Flowers spiked, distant. Leaflets ovate, somewhat retuse, viscid beneath.

Linn., *Sp. Pl.* 1046; Woodville, ii. 169; Stephenson and Churchill, iii. 134; Lindley, *Fl. Med.* 243.

Common Names.—Liquorice; Common liquorice.

Foreign Names.—Reglisse, *Fr.;* Liquirizia, *It.;* Lackrizen, *Ger.*

Fig. 121.

G. glabra.

Description.—Root perennial, long, giving rise to several erect stems of a pale-green colour, and striated, with a few branches. The leaves are alternate, pinnated, and composed of five or six pairs of leaflets, with a terminal one on somewhat long petioles; the leaflets are ovate, somewhat retuse, petiolate, of a yellowish-green colour, and viscid on the under surface. The flowers are in pedunculated spikes, shorter than the leaves. They are small, and of a bluish or purplish colour. The calyx is persistent, tubular, bilabiate, and five-toothed. The corolla consists of an ovate, lanceolate, obtuse, erect vexillum, two oblong alæ, and a two-parted, straight carina. The stamens are diadelphous; the anthers simple and rounded. The ovary is short, with a subulate style and blunt stigma. The legumes are oblong, smooth, compressed, pointed, and one-celled, containing two or three small, reniform scales.

The Liquorice is a native of the south of Europe and Asia, but is capable of cultivation in much colder climates. It was well known to the ancients, and is noticed by Dioscorides and Hippocrates, and appears to have been in very general use in the time of Pliny, as he says of it "præstantissima in Cilicia, secunda Ponto, radice dulci, et hac tantum in usu." There is, however, some difference of opinion as to the exact species known to the Greeks, whether it was the one under consideration or not. Dr. Sibthorp inclines to think it was the *G. echinata*, and Dierbach, the *G. glandu-*

lifera, both of which possess sweet roots, though not as pleasant or succulent as the *G. glabra*.

The only part used is the root; this is in long, cylindrical pieces, about as thick as the finger, of a grayish-brown colour externally, and yellowish within. The odour is faint, but earthy and peculiar; the taste is very sweet and mucilaginous. Unlike other sweets, it has long had the reputation of not causing thirst; this is attributed by Cullen to an acrid and bitter principle which follows the extraction of the sweetness when chewed. It contains, according to an analysis by Robiquet, glycyrrhizin, asparagin, starch, oil, albumen, some salts, &c. Glycyrrhizin belongs to the uncrystallizable sugars, and is not susceptible of vinous fermentation, and is the sweet principle in the root; the bitterness is owing to the resinous oil.

A large quantity of liquorice is imported in the form of an extract, from Spain and the Mediterranean ports. That from Spain, which is the best, is obtained from the *G. glabra*, whilst that from Sicily and Calabria is principally made from the *G. echinata*.

The extract is manufactured on a large scale in Spain, the exports of it from that country being upwards of two hundred tons annually; a large proportion of this is sent to London, where it is used in the brewing of porter. This extract, from the manner in which it is made, is very impure, and much of the saccharine principle in it, is charred by the heat used in evaporation, and requires to be refined or purified for pharmaceutical purposes.

Medical Properties, &c.—Both the root and the extract are demulcent, emollient, and nutritive, and are much employed in inflammatory affections of the mucous membranes, especially of the respiratory organs, either alone or combined with mucilaginous substances. They are also used to cover the unpleasant taste of several bitter and nauseous drugs, and the powder of the root, to give the proper consistence to pills, and to prevent their adhesion to each other.

Tephrosia.—*Persoon.*

Calyx ebracteolate, 5-toothed or 5-cleft. Vexillum large, roundish, spreading or reflexed; keel obtuse, cohering to the wings. Stamens monadelphous or occasionally diadelphous; the tenth filament sometimes half united with the others. Style filiform, bearded longitudinally, or glabrous; stigma terminal. Legume usually sessile, and much compressed; linear, many-seeded. Seeds compressed.

The plants of this genus are shrubby or herbaceous, with erect or procumbent, silky-villous stems. The leaves are unequally pinnate, with the stipules free from the petiole, lanceolate or subulate. The flowers are in terminal or axillary racemes, and white or purplish. They occur principally in tropical Asia or America, about five species being natives of the United States. Their properties are very various. The bitter root of *T. purpurea* is prescribed by Hindoo practitioners in dyspepsia, lientery, and tympanitis (*Ainslie*, ii. 49.) *T. senna* is used in Popayan as a substitute for senna (Humb. & Bon. *Nov. Gen.* vi. 459). *T. leptostachya* has some reputation in Senegal as a purgative (Merat & De Lens, *Dict.* vi.) *T. toxicaria* is employed in Jamaica for intoxicating fish (Lunan, *Hort. Jam.* ii. 217), and *T. apollinea* is used to adulterate the Alexandria Senna, and according to Mr. Hoskins, is cultivated in Nubia, for its indigo. It is a small plant, covered with closely-pressed down.

Fig. 122.

T. apollinea. Legume and Leaflet.

T. virginiana, *Persoon.*—Stem erect, villous-pubescent; leaves subsessile, leaflets 8—14

pairs, linear, oblong, obtuse or somewhat acute, mucronate; raceme terminal, subsessile; calyx very villous; segments about as long as the tube.

Persoon, *Synop.* ii. 329; Torrey & Gray, *Fl.* i. 296; Lindley, *Fl. Med.* 244.

Common Names.—Turkey pea, Goats' rue, Catgut.

Description.—Roots matted, very long, slender; stems many, simple, one to two feet high, clothed with a whitish, villous pubescence. Leaves unequally pinnate; leaflets 8—14 pairs, linear-oblong or elliptical, obtuse or rather acute, mucronate, silky-villous beneath, minutely silky pubescent above. Raceme of flowers terminal, oblong, sessile. Calyx very villous, 5-cleft, the segments acuminate, cuspidate, about as long as the tube. Corolla of a dark-yellow colour, tinged with red or purple; keel petals very broad. Stamens diadelphous. Style longitudinally bearded on the inside. Legumes long, somewhat falcate and villous. Seeds many; compressed.

It is found in dry, sandy soils, in most parts of the United States, flowering in June and July. Several varieties occur both in the colour of the flowers and in the degree of pubescence of the leaves. It is a very ornamental plant, and well deserving of cultivation.

Medical Uses.—The roots were used by the Indians as a vermifuge before the settlement of the country by the whites, and are a popular remedy in many parts at the present time. The mode of administration is in a decoction which is said to act powerfully, and to be as effectual as Spigelia; it has not, as far as can be ascertained, been employed in regular practice, but it deserves a fair trial, as the other species, as noticed above, are possessed of active qualities, especially of a purgative character.

Robinia.—*Linn.*

Calyx small, campanulate, 5-toothed or 5-cleft, 2 upper segments shorter. Stamens diadelphous, caducous. Legume many-seeded, compressed, nearly sessile. Seeds small, compressed.

A small genus of trees or shrubs, most of which are natives of South America. Three are found in the United States. The leaves are unequally pinnate, with petiolate, stipellate leaflets. The flowers are white or rose-coloured, in pendant, axillary racemes.

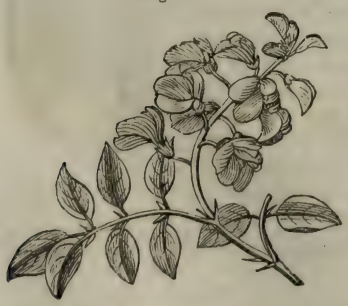
R. pseudacacia, *Linn.*—Branches virgate, armed with stipular prickles. Racemes loose, drooping, and smooth. Leaflets ovate or oblong-ovate. Legumes smooth.

Linn., *Gen. Pl.*, 879; Torrey and Gray, i. 294; Mich., *Fl. Syl.* ii. t. 76.

Common Names.—Locust tree; Black Locust; Yellow Locust.

Foreign Names.—Robinier, *Fr.;* Falsa acacia, *It.;* Unæchte aciacienbaum, *Gr.*

Fig. 123.



R. pseudacacia.

Description.—A tree from forty to fifty feet in height, with a trunk of a foot to two feet in diameter, covered with a darkish-coloured rough bark. The branches are numerous, and armed with short, strong spines. The leaves are unequally pinnate. The leaflets are 4—8 pairs, with minute setaceous, partial, stipules, and of a bright green colour. The flowers are produced from the sides of the branches, in long pendulous racemes, of a white colour, and somewhat fragrant smell, and are succeeded by compressed pods of three or four inches in length, and half an inch in width, containing several hard, reniform seeds.

It is found in many parts of the United States, but is most common west of the

mountains, not appearing to be indigenous to the north of Pennsylvania or near the sea coast in the Southern States. This well-known tree has not received the attention it deserves; for, although highly esteemed for the valuable properties of its wood, which from its durability is extensively used for tree-nails in ship building, and for posts; this is generally considered to be the extent of its usefulness, but such is far from being the case, as almost every portion of it is endowed with some good quality.

The leaves, when prepared in the same manner as those of the Indigo plant, may be advantageously used as a substitute for them; they also afford an excellent nourishment for cattle, either in a fresh or dried state. (*Willich. Dom. Ency.* i. 10.) The flowers possess antispasmodic properties, and furnish a very agreeable syrup; and an excellent liqueur has also been prepared from them. (Bonafous, *Ann. Hort.* ix. 168.) It has also been asserted by Grosier (*Descrip. de la Chine*, i. 507), that they are used by the Chinese to produce the beautiful yellow so remarkable in their silks by the following process: half a pound of the flowers not fully expanded, are roasted over a gentle fire, in a copper pan, stirring them continually; when they turn yellow, some water is poured on them, and boiled till it acquires a deep colour; it is then strained, and half an ounce of alum and an ounce of shell lime added, when the dye is fit for use. The author has perhaps mistaken the plant for the *R. flava*, as it appears strange that a white flower should furnish a bright yellow dye. Merat and De Lens (*Dict. Univ. Mat. Med.* vi. 101), likewise state that these flowers furnish a palatable dish, when fried. The seeds are somewhat acrid, but furnisha large quantity of oil on expression; by infusion in water, they become perfectly mild, and afford an excellent farina. The inner bark is fibrous, and capable of being spun.

Medical Uses, &c.—The bark of the root is sweetish, but cathartic and emetic, and is used in some parts of the country in domestic practice. From a case recorded by Dr. Gendron (*Ann. Clin. Montp.* xxiv. 68), of some boys who had chewed some of the bark and swallowed the juice, it would appear that it also possesses some acro-narcotic properties, as, besides vomiting, they were affected with coma and slight convulsions.

Several other species have likewise been used medicinally. The root of *R. amara* is a powerful bitter, and is prescribed in China in diarrhœa and obstructions of the mesentery and uterus; and that of the *R. flava* is employed in the same country as a febrifuge. (Loureiro, *Flor. Cochin.* ii. 556.) Humboldt and Bonpland state that the powdered bark of the *R. maculata* is employed in Campeachy as a poison for rats and mice. (*Nov. Gen.* vi. 395.)

Astragalus.—*Linn.*

Calyx 5-toothed. Corolla with an obtuse carina. Stamens diadelphous. Legumes gibbous, of two longitudinal cells, or half cells; lower suture inflexed.

This very extensive genus is composed of suffruticose or herbaceous plants, having pinnate leaves, furnished with stipules, either distinct from, or connected with, the petiole; and in one division or sub-genus, the *Tragacanthi*, with these petioles rigidly persistent, forming spines. The flowers are glomerate or spiked, and axillary or terminal. The greater portion of them are natives of Asia.

Most of the spinous species furnish a peculiar exudation, known under the name of *Gum tragacanth;* this is more particularly the case with those found in warm regions; and it is highly probable, that under the same circumstances, the whole of them would afford a similar product. This supposition is strengthened by a number of analogous instances; thus, the Manna Ash exudes its peculiar juice in Sicily and Calabria, but in more northern parts is

destitute of it, and the same takes place with the Liquidambar, as in Georgia, &c., it affords large quantities of balsam, whilst in Pennsylvania this secretion is almost wanting in it.

All the spiny species of Astragalus possess the same general appearance and characteristics, and form so natural a group, that it was proposed by some botanists to erect them into a genus under the name of *Tragacantha*. They are, without exception, small shrubs, with very numerous branches, covered with imbricated scales, and beset with spines. So great is their analogy and resemblance, that Linnæus considered them as varieties of one species. The more recent researches of Pallas, Liedebour, and De Candolle, have shown the error of this amalgamation; though it must be confessed that the characters assigned to these species are vague and unsatisfactory, and may arise rather from climate and situation than from any inherent difference in the plants. In fact, the confusion that exists in the synonymy is so great, that it has become almost impossible to ascertain what species really exist, and what are founded on varieties. Thus, the original *A. tragacantha* of Linnæus is the *A. massiliensis* of Lamarck, and the *A. massiliensis* of the former is the *A. aristatus* of Villars, though not perhaps of Sieber or Sibthorp. The *A. tragacantha* of Hablizt is the *A. poterium* of Pallas; the *A. creticus* of Lamarck is the *A. echinoides* of Willdenow, and the *A. gummifer* of Labillardière is the *A. caucasicus* of De Candolle, &c. From this confusion it becomes almost impossible to decide what species furnish the gum of commerce, though it is certain it is from the spinous kinds only. The London College and the United States Pharmacopœia have followed Olivier in ascribing it to the *A. verus*, and the Edinburgh to the *A. gummifer*, in accordance to the opinion of Labillardière. The species which are generally admitted are four, and will, therefore, be noticed separately.

1. A. VERUS, *Olivier*.—Flowers axillary, in clusters of 2—5, sessile. Calyx tomentose, obtusely 5-toothed. Leaflets 8—9 pairs, linear, hispid.

Olivier, *Voyage*, iii. t. 44; De Candolle, ii. 296; Lindley, *Fl. Med.*, 247.

This species is found in Asia Minor, Armenia, and Persia, and is stated by Olivier (*Voyage dans l'Empire Ottoman*, iii. 44) to afford the largest proportion of the gum sent to Europe. It, like the others, is a low shrub, and very hispid.

2. A. GUMMIFER., *Labillardière*.—Flowers 3—5, axillary, sessile. Calyx 5-cleft, and with the legumes woolly. Leaflets 4—6 pairs, oblong, linear, smooth.

Labill., *Journ. Phys.*, 1790; De Candolle, *Prod.*, ii. 296; Lindley, *Fl. Med.*, 247.

It is a native of Syria and Koordistan, and, according to Lindley (*Bot. Reg.*, 1840), who received specimens of it from the English consul at Erzeroun, is the plant furnishing the best kind of tragacanth.

Fig. 124.

A. creticus.

3. A. CRETICUS, *Tournefort*.—Flowers axillary, sessile, clustered. Calyx 5-partite, with setaceous lobes, rather longer than the corolla. Leaflets 5—8 pairs, oblong, acute, tomentose.

Lamarck, *Dict.*, i. 321; De Candolle, *Astrag.*, t. 38; Lindley, *Fl. Med.*, 248.

This grows in Crete, where it was found by Tournefort, and considered by him to be the source from whence the gum was obtained. There is little doubt that this is the species alluded to by the ancient writers, though Dr. Sibthorp is of opinion that it was the next.

4. A. ARISTATUS, *L'Heritier*.—Peduncles very short, usually 6-flowered. Teeth of calyx long and setaceous. Leaves with 6—9 pairs of linear, oblong, pointed, hairy leaflets.

A native of mountainous situations in the south of Europe and Greece, and, as above stated, was considered by Sibthorp to be the species known to the ancients as furnishing gum. Some of the Tragacanth imported from Smyrna and Marseilles is the product of this plant.

Dr. Lindley has also described another species, the *A. strobiliferus* (not of Royle; *A. Dicksonii*, Royle), from Koordistan, as the origin of the inferior or dark-coloured gum; but it is evident, from an inspection of the gum of commerce, that all the qualities are collected at the same time, and that they have a common source, as, whatever may be the port from whence they come, both kinds are mingled together; and it moreover is shown, that this product must be ascribed rather to a sub-genus of Astragalus, than to any particular species.

Tragacanth, as found in commerce, consists of several varieties, as regards the colour and form of the pieces, though in the same parcel they may all be found. The best is in tortuous, vermicular fragments, often flattened or convoluted, of a whitish or yellowish-white appearance, and in some cases translucent. The inferior kind is darker coloured, and of a rounded or oblong form more frequently than vermicular. This gum is hard and tough, and is pulverized with much difficulty, except when thoroughly dry and in a heated mortar. Its taste is mucilaginous and mawkish; it has no odour. When water is added to it, it absorbs a portion of the fluid, swells much, and forms a soft mass, but does not dissolve on the addition of more water. The mixture forms a uniform, tenacious paste or mucilage; this, when thin, separates into two portions, the upper consisting of water, with a small quantity of soluble gum, and the lower of the Tragacanth, in a pasty form. From different analyses, it is shown to consist of two distinct gums, of dissimilar properties, the one called *Adragantin*, or the soluble part; this differs from arabin in several of its characters; the other termed *Bassorin*, or the insoluble portion; this merely imbibes water, but does not dissolve in it.

Medical Properties, &c.—Tragacanth is merely emollient, demulcent, and nutritive; but is not as easily digested as some of the other gums. It is employed rather as a vehicle for the administration of other medicines than for its own remedial properties.

Many other species of this extensive genus have been employed in medicine, though none of them are regarded as officinal by our own or the British pharmaceutical authorities. The *A. exscapus*, a native of the Alps, was brought forward in the latter part of the last century, as a remedy in venereal affections, especially those of a constitutional character, and where nocturnal pains existed. From trials made with it, it was found inferior to many other articles, and its use has therefore been abandoned.

MUCUNA.—*Adanson.*

Calyx campanulate, bilabiate, the lower lip trifid, the upper entire. Vexillum ascending, shorter than the carina or alæ. Carina oblong, straight, acute. Alæ oblong, as long as carina. Stamens diadelphous, anthers 20, of which 5 are oblong, linear, and 5-ovate, hirsute. Legume oblong, 2-valved, with cellular partitions.

This genus has undergone many changes in its nomenclature, being at one time included in *Phaseolus*, then in *Dolichos;* afterwards separated by Browne, under the name of *Stizolobium*, and by Roxburgh, under that of *Carpopogon;* whilst at present it is recognised as *Macuna*, as first instituted by Adanson. The species are twining herbs, with pinnately-ternate leaves

and axillary racemes. The legumes are hispid and stinging, owing to their being covered with very brittle, pungent hairs.

M. PRURIENS, *Linn.*—Legumes with somewhat keeled valves. Leaflets hairy beneath, acuminate; the middle one rhomboidal, the lateral ones dilated externally.

Dolichos pruriens, Linn., *Sp. Pl.* 867; Woodville, iii. 172; Stokes, *Bot. Mat. Med.*, iv. 22; Stephenson and Churchill, iii. 179; *M. pruriens*, De Candolle, *Prod.*, ii. 405; Lindley, *Fl. Med.* 253.

Common Names.—Cow-itch, Cowhage.

Foreign Names.—Pois à gratter, *Fr.*; Fagiolo antelmintico, *It.*; Kratzbohnen, *Ger.*

Fig. 125.

M. pruriens.

a. Flower. *b*. Stamens. *c*. United do. *d*. *e*. Separate do.

Description.—The root is perennial and fibrous. The stem is herbaceous, climbing, cylindrical, tomentose, divided into many branches. The leaves are ternate, petiolate. The central leaflet is rhomboidal, and the two lateral ones oblique, dilated externally, all of them entire, acuminate, smooth on the upper surface, and hairy beneath. The flowers are large, inodorous, of a purplish or violet colour, and collected by threes in long, pendulous, axillary racemes. The calyx is bilabiate, the lower lip trifid, and the upper entire, semi-ovate. The corolla consists of a vexillum, which is roundish, concave, and double the length of the calyx, but shorter than the other petals. The carina is straight, obtuse, and furnished on each side of the apex with a short spur. The alæ are oblong, and as long as the carina. The stamens are ten, diadelphous, five of them supporting oblong, linear anthers, and the others ovate, hirsute ones. The ovary is oblong, villous, and furnished with a slender style, with a small, orbicular stigma. The legume is a coriaceous pod, compressed, curved like the letter *f*, thickly set with short, reddish, pungent, brittle hairs, somewhat terete, and keeled. The seeds are oval, and of a brown colour.

This species is a native of the West Indian Islands, and has generally been considered the same as the East Indian *M. prurita*, until the differences were pointed out by Sir W. J. Hooker (*Bot. Miscell.*, ii. 348). It does not appear to have been known before it was described by Ray (*Hist.*, 887.) It is very uncertain when it was first used in medicine as an anthelmintic, though it appears that, finding it employed for this purpose in the West Indies, Drs. Bancroft and Kerr recommended it to the attention of the profession about the year 1780. Ainslie states that it was not in use in India as an anthelmintic; and the writers on the Materia Medica, about the commencement of the last century, speak of the beans being used in dropsies, but never of the spiculæ for the expulsion of worms. Sir Hans Sloane notices the diuretic qualities of the roots and pods, but says nothing of any vermifuge properties. Browne (*Jamaica*), it is true, states that a syrup is made of the pods which is effectual against worms. The first account that entered into any details, was that given by Dr. Kerr, in the Edinburgh Medical Commentaries. The fullest, however, is that by Dr. Bancroft (*Hist. Guiana*),

who states, that during his residence in Guiana, he found it in general use as a remedy in the removal of *lumbrici*. In consequence of his recommendation it was introduced into Europe, and was employed very generally.

The officinal portion is the hairs of the pods; these latter are principally brought from the West Indies. They are of a brownish colour, shaped like an italic *f*, and are densely covered with short, brown, rigid, pungent hairs, which create an intolerable itching when applied to the skin.

Medical Properties, &c.—The hairs are celebrated for their anthelmintic properties; these are considered to be wholly mechanical, or in other words, to irritate and pierce the worms, and thus oblige them to relinquish their adhesion to the bowel. That they are capable of exercising this action on worms out of the body there is no doubt, but it is difficult to understand how they can operate on the worms in the intestines, without, at the same time, acting equally on the bowel itself; the common explanation of the mucous coat being protected by its secretion, is scarcely sufficient to account for it, as the worms are also enveloped in it, added to which these spiculæ would readily penetrate this mucus. Another objection is, that the spiculæ are softened by the fluids of the stomach and bowels, so as to lose most of their penetrating and irritating power, and yet there is no other mode of explaining their action, except as mechanical agents, as a decoction has no anthelmintic power, nor is there any thing in the chemical composition of the hairs that could induce a vermifuge effect, as the only article found besides lignin was some tannin. Be the cause what it may, there can be no doubt of the efficacy of this remedy in the expulsion of lumbrici. The mode of administration is to mix a sufficient quantity of the setæ with molasses or syrup to give it the consistence of thick honey, of this a teaspoonful is a dose for a child, and a tablespoonful for an adult, to be taken night and morning, to be followed in a few days by a brisk cathartic.

The roots are used by the native practitioners in India as a remedy in cholera, being given in a strong infusion, sweetened with honey; and Ainslie also states that the beans are used as food.

There are several other species all possessing the same hairy pods, and probably identical in their effects; among which the *M. prurita*, as before stated, has generally been confounded with the plant under consideration.

Pterocarpus.—*Linn.*

Sepals 5, cohering at base. Petals 5. Stamens 10, variously combined. Legume indehiscent, irregular, somewhat falcate, surrounded with a wing, often varicose, 1—3-celled; each cell 1-seeded.

This genus, which derives its name from the orbicular and winged form of its seed-vessels, contains about twenty-five species of trees and shrubs peculiar to tropical climates; they all have an astringent bark, and generally abound in red-coloured resinous juice. Several species have been employed in medicine, though but two are recognised as officinal.

1. P. erinaceus, *Lamarck.*—Leaves pinnate; leaflets alternate, elliptical, obtuse, glabrous above somewhat pubescent beneath. Legume with a short, straight point.

Lamarck, *Dict.* v. 728; De Candolle, *Prod.* ii. 419; Stephenson and Churchill, iii. 168; Hooker in *Gray Trav.* 395.

Description.—A middle-sized tree, with spreading branches, covered with an ash-coloured bark. The leaves are deciduous, pinnate; the leaflets are alternate, ovate, entire, smooth above and reddish pubescent beneath, and supported on short petioles. The flowers are numerous, yellow, on short curved peduncles, furnished with two small subulate bracts. They are in compound and terminal racemes. The calyx is campanulate, unequally 5-toothed, pubescent. The flowers are caducous, and consist of a roundish,

cordate vexillum; two lanceolate alæ, and a double carina. The stamens are alternately longer, united at base, with roundish, yellow anthers. The ovary is oblong pubescent, with a curved, filiform style and simple stigma. The fruit is a compressed, orbicular pod, with a leaf-like edge, covered at the side with white bristles, and containing a single reniform seed.

This tree is a native of Africa, and was first noticed by the celebrated Park, who found it on the Gambia, and sent specimens to Europe. It was, however, first described by Lamarck in the Encyclopedie Methodique. The fullest account of it has been given by Messrs. Gray and Dochard (*Travels in Western Africa*); they state that it is known to the inhabitants by the name of *Kari*, that it loses its leaves in November, and flowers in the succeeding month, and also that it is the tree from which the African kino is obtained.

The history of this astringent gum-resin is deserving of notice. In 1757 Dr. Fothergill first described an astringent gum which he supposed to be derived from the vicinity of the Gambia, in 1774 it was recognised in the Edinburgh Pharmacopœia as *kino*, and in 1787 by that of London, but in a few years, several substances under this name, but from various countries, and differing from each other in external appearance, and in astringency, appeared in commerce, and at last superseded the original article so completely, that it is now seldom met with. The origin of most of these is unknown, but it has been ascertained that the Botany Bay kind is the product of the *Eucalyptus resinifera;* the Jamaica of the *Coccoloba uvifera;* the East Indian of the *Nauclea gambir*, of the *Butea frondosa*, but principally of a tree which Pereira supposes may be the *Pterocarpus marsupium*. This is confirmed by Royle, who shows incontestably that most of the kino from the Malabar coast is derived from this source. He describes the plant as follows:

2. Marsupium, *Roxburgh.*—Leaves pinnate, leaflets 5—7, alternate, elliptic, emarginate. Legume with the under three-fourths orbicular, the upper side straight.

Roxburgh, *Corom. Pl.* ii. t. 116; *Fl. Ind.* iii. p. 234; De Candolle, *Prod.* ii. 418; Lindley, *Fl. Med.* 256.

Description.—A lofty tree, with the outer layer of bark brown, and the inner red, fibrous and astringent; leaves pinnate; leaflets alternate 5—7, elliptic, emarginate, of a dark-green colour, and shining above; panicles terminal, petals yellowish-white, long clawed, waved or crested on the margins; stamens ten, united at base, but divided into two parcels above; ovary 2-celled. Legume on a long petiole, the lower edge curved, the upper straight; the whole surrounded with a waved membranous wing, which is rugose and woody in the centre; generally one but sometimes 2-celled. Seed single, reniform.

Fig. 126.

P. marsupium.

This tree is found in the elevated portions of Malabar, and also at the foot of the Himalaya mountains.

All these varieties contain a large proportion of modified tannin. They dissolve better in alcohol than in water, being muddy in solution in the latter, but transparent, and of a rich red colour in the former. From the analyses of Vauquelin and Bucher it is shown that the East Indian contains about 75 of modified tannin, the remainder being a red gum and catechine.

Medical Properties, &c.—Kino is powerfully astringent, and is given in the same manner and for the same purposes as Catechu. It is principally employed in obstinate chronic diarrhœas, and in uterine and intestinal hæmorrhages, either alone or combined with other astringents. It has also been employed to restrain mucous secretions. Externally it is used as a wash to indolent ulcers and as a gargle. It is given in substance in a dose of from ten grains to half a drachm. The tincture in doses of from one to two drachms.

3. P. Santalinus, *Linn.*—Leaves ternate; leaflets roundish, retuse, glabrous. Petals with long claws, crenate, waved. Legume long stalked, with a broad membranous wing, obtuse at base.

Linn., *Suppl.* 318; Woodville, iv. t. 254; Stephenson and Churchill, iii. 168.

Common Name.—Red Saunders.

Foreign Names.—Santale rouge, *Fr.;* Sandalo rosso, *It.;* Rothes sandalholtz, *Ger.*

Description.—The Red Saunders is a lofty tree with alternate branches, covered with a brown bark. The leaves are ternate, seldom pinnate, with ovate, blunt, entire leaflets, which are very smooth on the upper surface, and hoary beneath. The flowers are in axillary simple or branched erect spikes. The calyx is five-toothed; the vexillum of the corolla is obcordate, reflexed, dentate and waved at the edges, of a yellow colour with red veins; the alæ are yellow, spreading, toothed and waved; the carina is oblong, inflated and curled at tip. The filaments are yellow, with globular white anthers. The ovary is oblong, compressed and hairy, supporting a curved style with a simple stigma. The legume is curved upwards, compressed, smooth, with a membranous wing, and contains one orbicular, compressed seed.

This tree is a native of the East Indies, thriving in a rich soil; it is very abundant in the Mysore and is also found in Ceylon, in both places at some elevation. It was first observed and described by Kœnig. The wood is imported in billets, which are blackish externally, of a blood-red internally, with black veins; they are very hard, heavy, and capable of a high polish. The wood has a slight odour, and a weak and nearly insipid taste. It has sometimes, but erroneously, been confounded with the Red Sandalwood, but is very different from that highly-perfumed substance. Its colouring matter is very sparingly soluble in water, but is readily so in alcohol, ether, or some of the volatile oils. Red Saunders has been found to consist of a peculiar colouring matter, called by Pelletier, *Santalin*, extractive, gallic acid, &c.

Medical Properties, &c.—Red Saunders was formerly used as a mild astringent and tonic, but is now seldom or ever employed, except as a colouring agent, especially in the preparation of compound tincture of Lavender.

Most of the other species of Pterocarpus furnish analogous products to the above; among them may be mentioned the *P. draco*, a large South American tree, which affords one of the varieties of gum-resin known under the name of Dragon's-blood; this comes from Carthagena, and is of inferior quality. The *P. flavus*, a native of China; the bark is used as a vulnerary and also as a dye.

Piscidia.—*Linn.*

Calyx campanulate, 5-cleft. Carina obtuse. Stamens monadelphous, with the tenth free at base. Style glabrous. Legume linear, with 4 membranous wings. Seeds oval, compressed.

A genus of West Indian trees, with unequally pinnate leaves. It derives its name from the bark, especially that of the root, being used to poison fish.

P. erythrina, *Swartz.*—Leaflets oblong, or obovate-elliptic; racemes axillary; peduncle of the legume, three times longer than the calyx; wings interrupted.

Linn., *Sp. Pl.* 993; Sloane, *Jam.* 2, t. 176, f. 45; Macfadyen, *Fl. Jam.* i. 258; Lindley, *Fl. Med.* 246.

Common Names.—Jamaica Dogwood; Common Dogwood.

Foreign Name.—Bois ivrant, *Fr.*

This tree is very common in Jamaica, and many of the other West Indian islands; flowering in the spring, before the appearance of the leaves. The wood is much esteemed, being heavy, firm, and durable. The bark is used to intoxicate fish; for which purpose it is coarsely powdered, and thrown into the deep, still water of some stream; or, being previously macerated with the lees of a still-house and quick-lime, and put into baskets, these are held over the side of a boat until their contents are washed out, when, in a short time, the fish are affected, and float on the surface.

Medical Uses, &c.—From the experiments of Dr. Hamilton, (*Lond. Med. & Phys. Journ.*, and *Journ. Phil. Coll. Pharm.*, v. 159,) it would appear that this bark is likely to prove a valuable addition to the Materia Medica. He found that the active ingredient in it, was of a resinous nature, and hence that a tincture was the best mode of exhibition. He used one ounce of powdered bark to twelve ounces of alcohol; the tincture obtained, was of a honey-yellow colour, with no offensive taste or smell. A drachm of this taken whilst suffering from a severe toothache, caused a burning sensation in the epigastric region, spreading to the surface, and a copious perspiration, followed by a deep sleep, with no unpleasant sensations on waking, as is the case with the preparations of opium. He also tried its effect as a topical application in cases of toothache from carious teeth, and found it successful in every instance, with no return of the pain. He states that the bark should be gathered in April, when the plant is in full flower. Should further experiments show that this bark has the efficient properties ascribed to it by Dr. Hamilton, it will supply a great desideratum in our curative agents.

Another species, the *P. carthagiensis*, also a native of Jamaica, and said by Lunan to be called Bitch-wood, has the same properties as the Dogwood. They both probably derive their name from the decoction of the bark being used to cure the mange in dogs.

Andira.—*Loureiro.*

Calyx urceolate, 5-toothed, or entire. Corolla papilionaceous. Stamens diadelphous. Legume drupaceous, 1-celled, 1-seeded.

This genus was first noticed by Piso, under the name of Andira, but was included in that of Geoffroya, of Linnæus, from which it has again been separated on account of the character of its fruit. At the same time, as is justly observed by De Candolle, these two genera are very closely allied; and neither of them can, with strictness, be considered as appertaining to the Fabaceæ, as their fruit is analogous to that of the Amygdaleæ. All the species are large trees, and possessed of medicinal properties.

A. INERMIS, *Kunth.*—Unarmed. Leaves pinnate; leaflets ovate-lanceolate, smooth on both sides.

Piso, *Bras.* t. 81; Linn., *Sp. Pl.* 1043; Woodville, ii. 112; Stephenson and Churchill, iii. 144; Wright, *Philos. Trans.* xlvii. 507; Swartz, *Fl. Ind. Occ.* 1255.

Common Names.—Cabbage Bark Tree; Bastard Cabbage Bark.

Foreign Names.—Geoffroya de la Jamaique, *Fr.;* Geoffroea, *It.;* Wurmrinde, *Ger.*

Description.—A lofty tree, with the branches towards the top, of a straight, smooth trunk. The bark is smooth and gray. The leaves are pinnate, composed of six or seven pairs of lanceolate, acuminate, smooth leaflets, of a dark-green colour, on short petioles, with a terminal one on a longer footstalk. The flowers are in large, branched, terminal, downy panicles. The calyx is campanulate, of a dark purple colour, and divided into five obtuse segments. The corolla is of a pale rose-colour, having a concave vexillum, emarginate at top, two oblong, obtuse, somewhat shorter alæ, and an obtuse, divided carina. The stamens are diadelphous, with roundish anthers. The ovary is oval, with a tapering, curved style, and hooked stigma. The fruit resembles a small plum, is pulpy, and contains a hard nut, or legume.

This tree is a native of Jamaica, and others of the West Indian Islands, where its bark has long been used as a vermifuge. This bark is in long, thick, fibrous pieces, externally of a brownish ash colour, and generally covered with lichens, internally yellowish; it has a resinous fracture, a disagreeable smell, and a sweetish, mucilaginous, bitterish taste. From an analysis by Huttenschmid (*Diss. Inaug.* 1824), it is shown to contain a colouring principle, gum, wax, resin, starch, phosphorus, several salts, and a peculiar alkaloid he has named *Jamaicine.*

Medical Properties, &c.—The anthelmintic properties of the bark were first made known by Mr. Duguid (*Edin. Phys. and Lit. Essays*), and afterwards more fully by Dr. Wright (*Philos. Trans.* lxvii.); but notwithstanding his testimony in its favour, supported by the still stronger commendation of Dr. Rush (*Med. Inquir.* 1), it never was generally employed by the profession, and is now almost forgotten. It, however, appears to be a powerful, certain, and safe vermifuge. It is given in powder, decoction, or syrup, which latter form is preferred; in any form, its use should commence in small doses, to avoid nausea and vomiting; and, according to Dr. Wright, cold water should not be drank during its operation. The fruit, or rather the kernel of the nut, has likewise been recommended as a vermifuge, and is said by Piso to be very active, though some experiments made at Paris have not confirmed his assertion; this may have arisen from the nut having lost its power by keeping.

The dose of the powdered bark, for an adult, is from a scruple to half a drachm; of the syrup, a teaspoonful two or three times a day; and of the decoction, about the same quantity. If any narcotic or other unpleasant effects arise, a dose of castor oil must be administered, and lime-juice freely taken.

† There are several other species of Andira possessed of very similar properties; the *A. Surinamensis*, a native of South America, is said to act in the same way, but to require larger quantities to produce the same effect. The bark of this tree was also analyzed by Dr. Huttenschmid, but with very different results; he attributes its power to the presence of an alkaloid he terms *Surinamine.* The *A. racemosa*, also peculiar to South America, according to Dr. Hamel, more closely resembles the *A. inermis;* and, as in that species, the nut is vermifuge in doses of a scruple. The *A. Harsfældii*, a native of Java, according to Leschenchault, is very different in its properties,

the nut being employed as an alexipharmic and stomachic. It is doubtful whether it properly belongs to this genus.

Myrospermum.—*Jacquin.*

Calyx campanulate, 5-toothed, persistent. Petals 5, the upper one largest. Stamens 10, free. Ovary oblong, membranous, with a filiform lateral style. Legume with the stalk naked at base but winged above, 1-celled; 1—2-seeded; seed covered with a balsamic juice.

This genus was established by Jacquin for certain trees peculiar to South America, and includes *Toluifera*, Linn. and *Myroxylon*, Mutis; the latter name had already been used by Forster for another plant. The meaning is sweet or odorous seeds. They have unequally pinnate leaves, and compressed, membranous, oftentimes one-seeded legumes.

1. M. peruiferum, *De Candolle.*—Leaflets coriaceous, pointed, emarginate, persistent. Claw of larger petal twice the length of the calyx. Wing of the legume very thick, not buried.

De Candolle, *Prod.* ii. 95; S. and C. ii. 102; Lindley, *Fl. Med.* 279; *Myroxylon peruiferum*, Linn., *Suppl.* 233.

Common Names.—Balsam of Peru; Quinquino.

Foreign Names.—Baume de Peru, *Fr.;* Balsamo del Peru, *It.;* Peruvianischer Balsam, *Ger.*

Fig. 127.

M. peruiferum.

Description.—A large and elegant tree, with the trunk and branches covered with a gray, coarse, thick, compact bark, of a pale colour internally, and filled with a fragrant resin. The branches are almost horizontal. The leaves are alternate, and are composed of two to five pairs of nearly opposite leaflets, which are ovate lanceolate, acute, but with the apex somewhat obtuse and emarginate, smooth, shining, entire, with pellucid dots, on short petioles. Many leaves terminate unequally. The flowers spring from the axils of the leaves in long, tomentose, erect racemes, longer than the leaves, with slender peduncles and a small bract at the base of each. The calyx is bell-shaped, dark-green, five-toothed. The corolla is formed of five petals, four of which are narrow, lanceolate, equal; the fifth broad, reflexed, and twice the size of the others. The stamens are ten, with elongate, sulcate anthers. The ovary is oblong pedicellate, with a short, subulate, crooked style bearing a simple stigma. The fruit is a pendulous, yellowish legume, somewhat clavate and curved, and terminating by the

persistent curved style. It contains a single seed, which is crescent-shaped, and enveloped in a liquid balsam, which at last becomes resinous.

This tree is a native of several parts of South America, in low, warm situations, and flowers from August to October. It is known to the natives of Peru under the name of *Quinquino*, and its bark and fruit by that of *Quinquina;* by the Mexicans *Hoitziloxitl*, and by the Brazilians *Cabureiba*. The tree abounds in a balsamic juice, which flows copiously on an incision being made into the bark. This balsam was long known and described before any accurate account of its source was published, as it was not until 1781 that Mutis sent specimens, under the name of Myroxylon, to the younger Linnæus, who described them in his *Supplementum*. It was afterwards more fully noticed by Ruiz, and at a still later period by Lambert, in his work on Cinchona.

The balsam soon attracted the attention of the Spaniards, and almost all the works published on the natural products of America notice it. Hernandez says that the tree was cultivated by the Mexican Emperors, and that if the bark be wounded at any time of the year, but especially at the close of the rainy season, a balsam distils from the incision, of a dark or blackish orange colour, of an acrid and somewhat bitter taste, and a most powerful but highly agreeable smell. Monardes states that there are two modes of obtaining it, one by incision into the tree, and the other by boiling the bark and branches in water; the first of these operations affording a white liquid balsam, and the second a dark one. Ruiz observes that it is procured by incision at the beginning of the spring, when the weather is showery; it is collected in bottles, where it keeps liquid for some years, and is called White liquid balsam. But when placed in mats or calabashes, as is done in Carthagena and the mountains of Tolu, it hardens, and is then termed dry balsam, or balsam of Tolu. He goes on to say, that according to Bomare, an extract can be made from the bark by boiling it in water; it always remains liquid and of a dark colour, and is known by the name of Black Peruvian Balsam. These accounts by no means agree, and it has been doubted whether the dark-coloured balsam is the product of coction, as it appears to be a natural exudation, as stated by Herdandez. From all that can be gathered on the subject, it would seem that the article known under the name of Balsam of Peru, may be obtained from more than one species of Myrospermum, and this is confirmed by the statement of Guibourt, that he had received specimens collected by M. Bazire, in San Salvador, from a species of this tree with a fruit differing widely from that of the *M. peruiferum*. Moreover, the balsam as found in commerce, presents varieties that seem to show a difference of origin.

Balsam of Peru, as usually met with, has the consistence of honey, is of a transparent brown or blackish colour, an agreeable smell, and a hot acrid taste. It is inflammable, but creates much smoke in burning; when boiled with water for some time, benzoic acid, or as stated by Fremy, cinnamonic acid is deposited from the fluid on cooling. It is soluble in alcohol, but soon forms a deposit. Many analyses have been made of it, with somewhat contradictory results. The last is that of Fremy (*Ann. de Chim.*); he found it composed of an, 1. Oily matter, which he calls *cinnameine*, containing, in solution, a crystalline substance, *metacinnameine;* 2. Cinnamonic acid; 3. One or more resins;—these results, however, have been doubted by several chemists.

Medical Properties, &c.—This balsam is very similar in action, on the system, to other analogous substances; it is stimulant and expectorant, and diminishes excessive secretion from the mucous membranes. Applied externally, it acts as a topical stimulant, and hence has been found useful in indolent ulcers. Internally it is principally administered in chronic affections

of the bronchial mucous membrane, but from its stimulating character, is not suited to those where there is inflammation. The dose is half a drachm, suspended in water by means of mucilage, or white of egg.

2. M. TOLUIFERUM, *Richard.*—Branches and leaves smooth. Leaflets oblong, acuminate thin, equilateral, rounded at base.

Common Name.—Balsam of Tolu tree.

Foreign Name.—Baumier de Tolu, *Fr.*

Richard, *Ann. Sci. Nat.* ii. 168; De Candolle, *Prod.* ii. 95; Lambert, *Edin. Jour.* xviii. 316; Lindley, *Fl. Med.* 279.

Description.—There has been no detailed description given of this tree. Richard, who saw specimens in Humboldt's herbarium, says that the leaflets are thin, membranous, and obovate, which are lengthened and pointed at their upper extremity, and also, that the terminal one is much larger than the lateral ones.

Linnæus first noticed it in his Materia Medica, and his son described it in his Supplementum as a new genus *Toluifera*, on account of fruit attributed to it by Miller, differing from that of *Myroxylon* (*Myrospermum*), but the subsequent researches of Ruiz, Ventenat, Richard, and others, have shown that it is a tree belonging to Myrospermum, and very closely allied to the *M. peruiferum*, so closely, in fact, that Ruiz considered them to be identical, but the distinctive characters have been ably pointed out by Richard, in a memoir in the *Annales de Sci. Nat.* for 1824. N. von Esenbeck, has figured the leaves (t. 322); these are so similar to those of the other species as to lead to a belief that Richard may be mistaken in supposing that they differ from each other. It is found in several parts of South America, but especially in Colombia, in the mountains of Tolu. At the same time it is very probable that what is termed Balsam of Tolu, is not only derived from this tree, but also from its kindred species, and that the two balsams of Peru and Tolu rather differ in mode of collection and preparation than in origin.

Monardes, who gave the first account of this balsam, states that it is procured by making incisions in the tree, and receiving the liquid juice in vessels of black wax, from which it is transferred to calabashes or earthen jars. When first imported, it is usually soft and tenacious, but by age becomes hard and brittle, resembling resin. It is transparent, shining, of a yellowish or reddish-brown colour, a very fragrant odour, and a sweetish, warm taste. It softens under the teeth, and when subjected to heat, readily melts; when inflamed, it evolves an agreeable smell. It is wholly soluble in alcohol, and like the balsam of Peru, gives up its acid to water. Its chemical composition is very similar to that balsam, and appears to differ only in its greater aptitude to become resinous.

Medical Properties, &c.—This, like the last, is stimulating and expectorant, and is used in the same class of complaints; from its agreeable flavour, it is more frequently employed, especially in the treatment of bronchial affections. It is also used as a flavouring ingredient in several mixtures. It is given in doses of ten to thirty grains in emulsion, or in the form of a syrup, which is officinal.

There are several other species which furnish a balsam; the *M. frutescens* of Jacquin affords a resinous juice, which, according to Kunth, is strong, and disagreeably flavoured, whilst that of the *M. pubescens*, which some writers deem identical with the *M. peruiferum*, is very analogous to the balsams above described. Kunth states that its seeds are used in South America in colic and other abdominal pains.

Sub-order 2. Cæsalpiniæ.—Petals imbricated in æstivation; the uppermost interior; stamens perigynous.

This sub-order is distinguished for its purgative properties, for although some of the species bear edible fruits, still they are comparatively few, and even of these, most are laxative when partaken of freely. Very few of them, at the same time, are poisonous, though some are emetic and anthelmintic, combined with the prevailing cathartic character.

The most important of this group in a medicinal point of view, are the *Cassias*, affording the senna of the shops; the *Copaiferas*, from which the Balsam of Copaiba is obtained, also are found here, as are likewise many of the dye-woods, as Logwood, Brazil wood, Camwood, &c. As before mentioned, some of them have edible fruits, as the Tamarind, the Ceratonia, West Indian locust, &c. The *Ceratonia siliqua* or Carob tree, has a large pod, the seeds of which are enveloped in a nutritious pulp, and is supposed to be the locust on which St. John fed in the wilderness; the seeds afford much oil, and are used in Spain to feed horses. The *Hymenæa courbaril* or West Indian locust, is valuable in many respects. The mealy substance in which the seeds are enclosed, is sweet and pleasant, but is apt to purge when fresh, but loses this property when kept; a decoction of it will ferment, and forms a drink resembling beer; a resin exudes from the roots, known under the name of *Gum anime;* a decoction of the inner bark is said to be anthelmintic. (Macfadyen, *Fl. Jam.* i. 349.)

Fig. 128.

Ceratonia siliqua.

Some species have tonic properties, among which may be noticed *Guilandina bonduc,* the bark and seeds of which are very bitter; the latter pounded fine and mixed with castor oil, are said to form a good external application in incipient hydrocele (*Ainslie*, ii. 136); in Cochin-China, according to Loureiro (*Fl. Coch. Ch.* i. 265), the leaves are considered deobstruent and emmenagogue, the root astringent, the seeds emetic, and the oil from them an excellent application in paralysis and convulsions. The *Poinciana pulcherrima* has a bitter and tonic root, but an infusion of the leaves or flowers is a powerful emmenagogue, and the seeds powdered are stated to relieve colic. (*Macfadyen*, i. 331.)

An oil is obtained from the seeds of some, as the *Cæsalpinia oleosperma*, whilst from others a gum exudes, as is the case with several species of *Bau-*

hinia, and, according to Martius, a gum resembling Senegal is the product of *Pithecolobium gummiferum*. It has been mentioned that *Anime* is procured from the *Hymenæa courbaril*, and the Mexican and Brazilian copal are supposed to be from other species; that of Madagascar is from the *H. verrucosa*.

Among the dyes, Logwood is from *Hæmatoxylon Campechianum;* Brazil wood from *Cæsalpinia echinata;* Braziletto wood from *C. Brasiliensis;* Sappan wood from *C. sappan;* Camwood from *Baphia nitida*, &c. Many of these trees afford a fine, hard, heavy wood, much used in the arts.

Hæmatoxylon.—*Linn.*

Sepals 5, united at base into a persistent tube; lobes caducous. Petals 5, not much longer than sepals. Stamens 10, diadelphous. Legume compressed, 1-celled, 2-seeded.

There is but a single species of this genus, which is peculiar to South America and the West Indies. Its name is founded on the blood-red colour of the heart-wood.

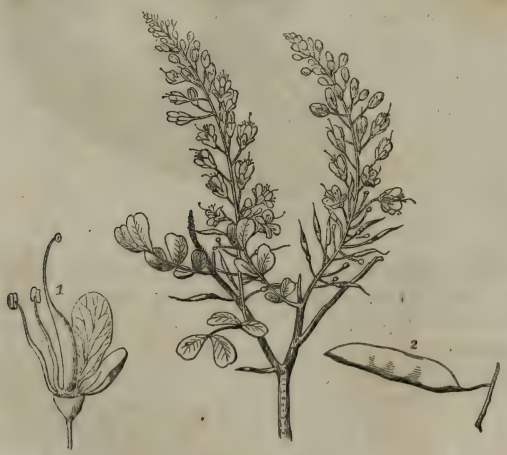
H. CAMPEACHIANUM, *Linn.*—The only species.

Linn., *Sp. Pl.* 549; Woodville, *Med. Bot.* iii. t. 163; Sloane, *Jam.* ii. t. 10, f. 1—4; Catesby, *Car.* iii. t. 66; Macfadyen, *Fl. Jam.* i. 332; Lindley, *Flor. Med.* 264.

Common Names.—Logwood; Campeachy wood.

Foreign Names.—Bois de Campeche, *Fr.;* Legno Campeggio, *It.;* Kampeschenholz, *Ger.*

Fig. 129.



H. campechianum.
1. Style. 2. Legume.

Description. — A middle-sized tree with a contorted trunk, rarely more than a foot and a half in diameter, and covered with an ash-coloured, rough bark. The branches are crooked, and beset with sharp thorns. The leaves are pinnate, or somewhat bipinnate, with obovate or subcordate leaflets. The flowers are yellow, have an agreeable odour, and are collected in terminal racemes. The sepals are united at base into a persistent tube, with five deciduous lobes. The petals are scarcely longer than the sepals. The stamens are ten; the filaments hairy at base, and the anthers without glands. The ovary is compressed, and bears a capillary style. The legume is flat, lanceolate, acuminate at both ends, 1-celled and 2-seeded, the valve bursting in the middle longitudinally. The seeds are transversely oblong.

The Logwood is a native originally of Campeachy, and other maritime parts of South America, but having been long since introduced into many of the West India islands, has become naturalized there. The part used both in medicine and the arts, is the heart-wood, the bark and white alburnum

being removed previous to exportation. As found in commerce, it is in logs of different sizes, of a dark colour externally, and a deep-red internally, heavy, and susceptible of a high polish. The taste is sweetish, somewhat astringent and peculiar; the odour is rather pleasant. For medical use it is either cut into chips, or rasped into a coarse powder. Its use in the arts as a dye is very great, it being the basis of many of the reds in printing calicoes.

It has several times been analyzed. Chevreul found in it, volatile oil, hæmatine, resinous matter, tannin, various salts, &c. Hæmatine, which is the colouring principle, is a red, crystalline substance, somewhat bitter, acrid, and astringent, soluble in alcohol and ether, and slightly so in water.

Medical Properties.—Logwood is a mild astringent, which has been used with some success in chronic diarrhœa, and especially in that weakened condition of the bowels subsequent to cholera infantum. When given for any time, its colouring principle is absorbed, and may be detected in the urine. It has also been administered in malignant dysentery and low fevers, in which Weinrich (*Diss. Inaug.* 1781), states that he has found it of more efficacy than cinchona. It is given in decoction or extract, both of which are officinal; the dose of the first is from an ounce to two ounces, and of the latter, ten grains to half a drachm. As an external application, the leaves beat into a pulp with a little turpentine, has been found useful in phagedenic sores of obstinate character. (*Macfadyen*, i. 334.)

Cassia.—*Linn.*

Sepals 5, scarcely united at base, more or less unequal. Petals 5, unequal. Stamens 10, free, unequal; the 3 upper usually sterile, the 3 lower longest, 4 middle short and straight; rarely 4—7, and all fertile. Anthers dehiscent at apex by 2 pores or clefts or by an opening at base. Ovary pedicellate. Legume various.

This extensive and important genus consists of trees, shrubs, and herbs, with simple and abruptly pinnate leaves, the leaflets opposite, and the petioles often furnished with glands. The species are found in most parts of the world, and many of them have long been employed as medicinal agents. Much difference of opinion exists among botanists as regards its limits; some dividing it into several distinct genera, whilst others, among whom is De Candolle, consider these divisions merely as sections. This view of the subject has been adopted rather from its having been followed in the Pharmacopœia, and by the principal authorities on Materia Medica, than from a conviction of its accuracy, as it is evident that some of the divisions have every right to generic rank, if marked differences in form of calyx and legumes are considered as sufficient grounds for such a distinction.

Sec. 1. Fistula, *D. C.*—Sepals obtuse. Anthers ovate, bicleft at apex. Legume terete or compressed, indehiscent, woody, with numerous transverse septæ; cells 1-seeded, filled with a soft pulp. Seeds elliptical, sub-compressed, horizontal.

1. C. fistula, *Linn.*—Leaflets 4—6 pairs, ovate, sub-acuminate, smooth; petioles egrandulate; racemes lax, ebracteate; legumes terete, straight, smooth, sub-obtuse.

Linn., *Sp. Pl.* 540; Woodville, iii. 160; Stokes, ii. 453; Stephenson and Churchill, iii. 155; Macfadyen, *Fl. Jam.*, i. 337; *Cathartocarpus fistula*, Persoon, *Synop.* i. 459; Lindley, *Fl. Med.* 262.

Common Names.—Cassia; Purging Cassia; Pudding-pipe tree.

Foreign Names.—Caneficier Cassier, *Fr.;* Cassia fistula, *It.;* Fistulkassie, *Ger.*

Description.—A middle-sized tree, much branched towards the top. The bark is brownish, or dark ash-coloured, and very much furrowed and cracked. The wood is soft and white. The leaves are alternate, and composed of four to six pairs of ovate, pointed, smooth leaflets, of a pale-green colour, supported on short petioles. The flowers are large, odorous, yellow, and produced in long pendant axillary racemes. The calyx has five oblong, obtuse sepals. The corolla consists of five petals which are concave, unequal, spreading, and waved. The ovary is slender, cylindrical and curved. The fruit is a long, woody brown pod about an inch in diameter, and nearly two feet in length, cylindrical, with two longitudinal furrows on one side, and one on the other, divided into numerous cells by thin plates or partitions, each containing a single, smooth, somewhat compressed seed, embedded in a soft black pulp.

This species of Cassia is a native of Egypt and the East Indies, but is now naturalized in the West Indies and South America. It was known to the Arab and Greek physicians of the middle ages, and is supposed to have received its name from its agreeable odour, somewhat resembling that of the celebrated spice. The pods, which are but seldom imported into this country, come from the West Indies, though it is stated that the East Indian afford a far sweeter and more grateful pulp. Those found in the shops do not appear to have undergone any preparation, but Hasselquist (*Voyage*) says that in Egypt they are collected before they are quite ripe, and carried into a close room, in which is prepared a layer of palm leaves and straw six inches thick, on which they are laid, the room closed, and the next day the heap sprinkled with water, and this process repeated. In this way they are treated for forty days till they become black.

The pulp is the part used, has a faint nauseous odour, and a sweet, rather pleasant mucilaginous taste. It contains sugar, gum, a matter resembling tannin, a glutinous substance, and a colouring principle (Henry, *Jour. Chim. Med.*) To prepare the pulp for use, the bruised pods have boiling water poured on them, so as to wash out the pulp, which is strained and then evaporated to a due consistence.

Medical Properties, &c.—In small doses, the pulp is a mild and agreeable laxative, and in larger ones purgative; but from the quantity required to produce this latter effect, it is apt to occasion nausea, flatulence and griping. It does not appear to possess any advantage over the pulp of prunes and is not as agreeable. It is seldom or never used in this country, and but seldom in England except in certain confections. The leaves and the flowers are also purgative.

The root also contains a bitter principle, and has been employed as a substitute for Peruvian bark. It contains a peculiar principle, which has been examined by Caventou, who regards it as a powerful diuretic. It forms soluble combinations with the mineral acids.

The pulp from the pods of several other species belonging to this group are possessed of the same qualities, but are not as agreeable to the taste; among these may be noticed the *C. brasiliana* and the *C. bacillaris*, the pod of which latter is very like the *C. fistula*, but smaller and pointed at the extremities.

Sec. 2. Senna, *Gært.*—Sepals obtuse. Anthers with 2 pores. Legumes membranaceous, flat, compressed, with many transverse partitions; scarcely dehiscent, almost pulpless. Seeds vertical or parallel to the valves, compressed, somewhat obcordate.

This section contains the officinal Senna, respecting which so much discrepancy of opinion exists among the writers on medical botany, scarcely any two of them agreeing as to the species. The following is the result of much study and comparison of descriptions and authorities, and although by

no means as satisfactory as could be wished, will be found to contain the sum of our knowledge on this intricate subject.

* *Glandless.*

1. C. MEDICA, *Forskall.*—Leaflets 5—8 pairs on short petioles, lanceolate-acute, smooth above, downy beneath. Petioles glandless. Legumes pendulous, membraneous flat, nearly straight.

A perennial, shrubby plant, with erect, round, smooth, stems, somewhat flexuous near their extremities. The leaves are alternate, abruptly pinnate, with 5—8 pairs of leaflets on short pedicels; they are ovate-acute on the lower branches, and lanceolate-acute on the upper portions of the plant; somewhat mucronate, smooth above, rather downy beneath, especially when young; with the veins turning inwards and forming a flexuous intramarginal line; petiole glandless; stipules softly spinescent, semi-hastate, spreading, minute. Racemes axillary and terminal, erect, stalked, rather longer than the leaves, pedicels ebracteolate. Sepals linear, obtuse. Petals bright yellow. Five lower stamens small and sterile, the two next large, curved and perfect, the three uppermost very small and glandlike. Ovary linear, downy, falcate, with a recurved, smooth style. Legumes pendulous, oblong, membraneous, about 1½ inch long and ⅝ broad, straight, tapering abruptly to the base and rounded at the apex, containing 5—8 whitish rugose seeds.

Forskall, *Fl. Arab.* 111.; *C. lanceolata*, Royle, *Illus.* 37; *Mat. Med.* 351; Wight and Arnott, i. 288; Wallich, *Med. Jour.* 1837; *C. elongata*, Lem. Lisanc, *Jour. Pharm.* vii. 345; Fee, *Cours d'Hist. Nat. Pharm.*, ii. 69; Pereira, *Mat. Med.* ii. 593; Wood and Bache, *C. officinalis;* Gœrtner, ii. t. 146; Roxburgh, *Fl. Ind.* ii. 346.

The following appear to belong to this species:

a. C. LANCEOLATA, *Royle* (*o. c.*)—Leaflets large, thin, lanceolate, smooth above, a little downy beneath. Legumes oblong, membraneous, straight, tapering suddenly at base, and rounded at apex.

Fig. 130.

C. medica, var. C. lanceolata, Royle.
1. Separated flowers. 2. Seed. 3. Legume.

This is cultivated in India; originally from Arabian seeds, but is stated by Dr. Burns to be wild near Kaira in Guzerat (*Royle Mat. Med.* 351). It does not seem to differ in any essential character from the "Senna meccæ, Lohajæ inveniebatur, foliis 5—7 jugis, lineari-lanceolatis." Forskall, (*o. c.*)

b. *C. lanceolata* of most authors; *C. acutifolia*, Heyne, ix. t. 41. Nees and Eberm. t. 345.

The leaves of this variety constitute the largest proportion of the Alexandria senna of commerce. It grows in upper Egypt, to the south and east of Syene and Assouan. Royle is of opinion that it is the plant figured by

Stephenson and Churchill t. 30, but Pereira considers this plate to represent the *C. ovata* of Merat and De Lens; and Lindley that it is intended for the *C. acutifolia*, *Delille*. This shows that these plants can at most be but varieties of each other.

Fig. 131.

C. medica, var. C. acutifolia, Nees.
a. Detached flower.

b. C. ACUTIFOLIA, *Delille*.—In this the leaves are lanceolate and acute; the pods being flat and elliptical, and curved at the upper margin. It is the *C. acutifolia*, Delille (*Fl. d'Egypte*, t. 27, fig. 1), and Esenbeck and Eberm. t. 346; *C. lanceolata*, Nectoux.

This variety also grows in Upper Egypt, and leaves answering to the description are always to be found in the Alexandria senna of commerce.

Dr. Royle observes of these varieties that he is "unable to distinguish them by any permanent characters; nor dried Senna leaves cultivated at Saharunpore from good specimens of Bombay Senna (that is ordinary Indian Senna) imported from India; nor those from Surra Mukki sent him by Dr. Malcolmson from Aden, and which he states are the produce of Africa, but in appearance exactly resemble the Arabian Senna."

2. C. OBOVATA, *Colladon*.—Leaflets in 4—7 pairs, smooth, obovate, rounded, mucronate. Legumes oblong, falcate, membranous, smooth, rounded at each end.

Colladon, *Mon.* 92; De Candolle, *Prod.* ii. 192; Lindley, *Fl. Med.* 259; *C. senna*, 3; Linn. *Sp. Pl.* 539; Nectoux, *Voyage*, *Pl.* 1; Lam. *Illus.* t. 332; *C. obtusa*, Wight and Arnott, i. 288; *Senna obtusa*, Roxburgh, *Fl. Ind.* ii. 344; *C. porturegalis*, Bancroft, *C. burmanni;* Wallich, *Med. Jour.* 1837.

A perennial shrub, about eighteen inches high. Stem pubescent at base, cylindrical. Leaves alternate, with two subulate, entire, persistent stipules at base; with from four to seven pairs of leaflets, which are opposite, nearly sessile, oboval, cuneiform, obtuse but mucronate, unequal at base; the uppermost gradually the largest, slightly pubescent. The flowers are pale yellow, and are disposed in erect, rather lax axillary racemes. The legumes oblong, fulcate, membranous, smooth, rounded at the two ends, with an elevated, interrupted ridge along the middle. The seeds are 6—8 and heart-shaped.

This species is found in Egypt, Nubia, Central Africa, Cape de Verds, India, &c., and has been naturalized in some of the West Indian islands, and cultivated in many parts of Southern Europe. It furnishes an inferior Senna, known under the name of Italian and Aleppo Senna, and is also one of the constituents of the Alexandrian. The *C. obtusata* of Heyne does not appear to differ materially from this species.

* * *Glandular.*

C. LANCEOLATA, *Forskäl.*—Leaflets in 4—5 pairs, never more; oblong, and either acute or obtuse, but neither ovate nor lanceolate, and never tomentose, even when young. Petioles with a small, round, brown gland, a little above the base. The legumes are erect, oblong, tapering to the base, turgid, mucronate, somewhat falcate, especially when young; at which time they are sparingly beset with scattered hairs.

This plant is a native of many places in Arabia, and is the *Suna* of the natives. It is considered by Forskäl as the true Mecca Senna. It differs from *C. medica* and its varieties by the presence of a gland on the petiole, and in the leaves never being tomentose.

Forskäl, *Fl. Arab.* 65; Lindley, *Fl. Med.* 259; *C. Forskälii*, Royle, *Mat. Med.* 350; *Sene de Nubie*, Nectoux, t. 2?

4. C. ÆTHIOPTICA, *Guibourt.*—Leaflets in 3—5 pairs, pubescent, oval-lanceolate. A gland at the base of the petiole, and one between each pair of leaflets. Legumes flat, smooth, not reniform, rounded, tawny-coloured, containing 3—5 seeds.

Guibourt, *Hist. des Drogues*, ed. 3, ii. 219; Lindley, *Fl. Med.* 259; *C. ovata*, Merat and De Lens, *Dict.* vi. 311; Royle, *Mat. Med.* 351.

Merat and De Lens are of opinion that it is *C. lanceolata*, fig. C. pl. xv. of Colladon, *Histoire Naturelle des Casses.* Guibourt, however, does not refer it to this, but says that it is represented by Sené de Nubie, plate 2, of Nectoux; and as before said, Pereira thinks that it is *C. senna*, Stephenson and Churchill, i. 30, which is stated by Lindley to be a good figure of *C. acutifolia*, Delille.

It is said to be a low shrub, not exceeding eighteen inches in height, found in Nubia and Fezzan, south of Tripoli. The leaves are smaller, shorter, and less acute than those of *C. lanceolata*, but may be a variety of it, though the presence of the additional glands appear to entitle it to be considered as distinct. As the plant has not been described by any botanist from perfect specimens, and all that is known of its characters are derived from the leaves and pods, as found in commerce, it is impossible to decide with certainty respecting it. It furnishes the Tripoli Senna, the least esteemed of the acute-leaved kinds.

These are the species supposed to yield the Senna, and it will be perceived, as before stated, that great confusion exists with regard to them. This has arisen from many causes; the principal of which are, the want of authentic specimens; the difficulty of studying the plants in their places of growth; the ignorance of what effect a difference of locality exercises in producing varieties, and whether the presence or absence of the glands on the petioles are to be assumed as specific characters. From my own observations on some West Indian species of Cassia, especially the *C. occidentalis*, I have been convinced that the presence, absence, or particular situation of the gland is a fallacious indication. In some specimens, the gland was wanting on one or more of the petioles; on others it was situated near the insertion, and again, might be seen between the first pair of leaflets. Delille admits that the plant he described and figured was the same as that noticed by Nectoux, and yet the first of these authors states that the petiole is without a gland, whilst the latter says that it has not only a gland at the base of the leafstalk, but one between each pair of leaflets. As the matter now stands, it appears that the older writers were right in making but two species, the *C. alexandria* and *C. italica;* the first including those with narrow and acute leaves, and the latter confined to what is now called *C. obovata.* Much observation and comparison are required before this question will be satisfactorily settled. Some excellent

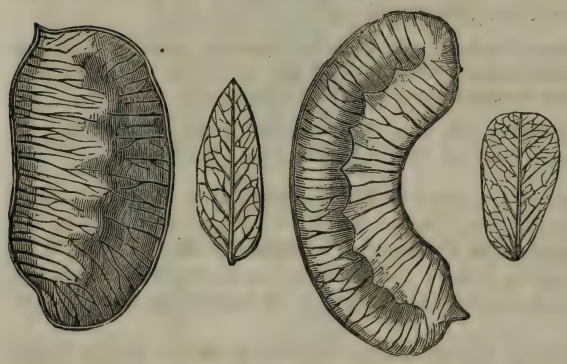
remarks on the subject, by Dr. J. Carson, will be found in the American Journal of Pharmacy, ii. 178.

Fortunately, this confusion does not exist in any great degree in the Sennas of commerce, which are divided into many kinds, designated by the names of the places at which they are grown, or from which they are imported.

Senna is brought from the different Mediterranean ports, and from India; much of the East Indian comes to this country by way of London. Numerous varieties have been described, but they may be reduced to three:—the Alexandrian, the East Indian, and the Tripoli.

Alexandrian.—This comes from the Egyptian and other Mediterranean ports, and consists not only of the leaves of the acute-leaved Cassias, but also of those of *C. obovata*, and is always adulterated with leaves and flowers of *Solenostemma argel*, sometimes with those of *Tephrosia apollinea*. Mr. Landerer states that it is chiefly brought from Upper Egypt, Nubia, Sennaar, &c., and is always obtained from wild plants. The harvest commences in September, when the branches of the shrub are cut, and exposed to the sun, until the leaves begin to fade. They are then collected into bundles, and placed on rocks and high grounds, so as to have the full benefit of the sun's rays and the air. When the leaves are quite dry, the branches are laid in heaps, and threshed until the leaves are separated from them. These not being broken or mixed with twigs and dirt, are the most prized. The leaves not being all detached by this means, the bundles are placed on a clay floor, and camels driven over them, till no more leaves remain attached. This process breaks them much, and they become mixed with portions of twigs, &c. The Senna thus collected in various places is packed in sacks, and conveyed to the Nile, where it is transferred to boats and carried to Cairo and Alexandria, where it is unpacked, sorted, and repacked in large bales. He further states, that the adulteration of Senna is not practised intentionally. (*Amer. Jour. Pharm.* xii. 74.) This latter assertion is widely different from that of other authors, who state that the admixture takes place at the various entrepôts on the Nile, where the Senna is received from the caravans. Rouillure (*Ann. de Chim.* lvi. 161) says that at Boulak, the proportions of the different leaves are, 500 parts of acute leaves to 300 of obtuse and 200 of Argel leaves.

Fig. 132.



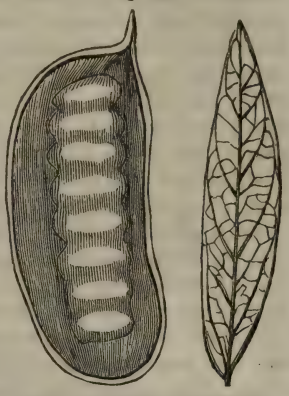
Legume and leaflet of C. medica, var. lanceolata. Do. do. of C. obovata.

As found in the shops, this kind of Senna is of a grayish-green colour, with an odour somewhat resembling that of tea, and an unpleasant, viscid taste. It presents a broken appearance, and consists of the leaves, flowers, and fruits of the above-mentioned plants, and various impurities. The Argel leaves and flowers may readily be recognised from those of Senna; the first by their paler colour, thicker and more coriaceous texture, by their being equilateral, and the imperfect developement of their lateral veins; the flowers by being in corymbs. Dr. Pereira states that in some bales, Argel flowers

nave constituted a third (see Solenostemma). The leaves and pods of the *Tephrosia* appear to be an accidental or involuntary admixture, and are seldom found in any quantity (see Tephrosia). It is said that on the continent of Europe the Senna is adulterated with the leaves of *Coriaria myrtifolia*, but this fraud is seldom or never practised on the parcels that come to this country.

East Indian Senna.—Is now much used in this country, and consists mainly of large, thin, unbroken leaves of a yellowish-green colour; they are seldom adulterated, the admixtures found among them being probably accidental. There are several varieties, the best of which is the Tinnivelly; which is the product of plants derived from seed obtained from Arabia. The other kinds are the Saharunpore, the Madras, and Bombay, the latter of which is the variety most frequently met with. All of them are of the acute form, and when good, are fully equal to the Alexandrian.

Fig. 133.



Legume and leaflet of Tinnivelly Senna.

Tripoli Senna.—This has much resemblance to the Alexandrian, but is still more broken, and contains more leaf-stalks, but is not adulterated with Argel. It consists of one of the acute-leaved species (*C. æthioptica*), and some slight admixture of *C. obovata*. It has not been held in much estimation, though a far purer Senna than the Alexandrian, and fully equal to that article in its remedial action. This may have arisen from its being lower in price, and still more from being deemed inferior; the refuse of other kinds having been sold for it.

The *Aleppo* or *Italian* Senna is never imported into this country. It consists of leaflets of *C. obovata*, and is said to be less effective as a purgative, and apt to create nausea and griping.

Senna is prepared for use by picking out the leaflets, and rejecting the leaf-stalks, pods, and any extraneous substances, as stones, &c. The pods, although but little employed in the United States, are possessed of considerable purgative powers, and are officinal in France and Germany. They are also much preferred to the leaves in the countries where Senna grows, and are sold in all the drug bazaars in Constantinople, Smyrna, &c. The leaves of the different Sennas, and

Fig. 134.

A. Cassia medica. B. Tinnivelly senna. C. C. acutifolia. D. Solenostemma argel. E. Coriaria myrtifolia. F. Tephrosia apollinea. G. C. obovata. H. C. obtusata.

those used for adulteration, are well represented in the annexed cut from Dr. Royle's Materia Medica, which gives a better idea of their differences of form than any description.

Senna has a faint, sickly odour, and a bitter, nauseous, and somewhat mucilaginous taste. It gives out its properties to cold and hot water, and to alcohol; long boiling impairs its purgative powers in a great degree. It has often been analyzed; the fullest examination of it is by MM. Lassaigne and Fenuelle (*Ann. de Chim.* xvi. 16). These chemists found it to contain a peculiar bitter principle, which is called *Cathartin;* yellow colouring matter, volatile oil, albumen, mucus, several salts, &c. It owes its properties to the cathartin; this is a yellowish-red, uncrystallizable substance, of a peculiar odour, and a bitter, nauseous taste, very soluble in water and alcohol. It is stated by Pereira to cause nausea, griping, and purging, in doses of three grains; but Royle says that M. Heelein, who has recently experimented upon it, states that it is not the active principle; and that he has taken four doses, of ℈j. each, at an interval of an hour and a half, without any effect.

Medical Uses.—Senna is an active and certain purgative, and is well adapted for all cases where it is wished to make a decided, but not very violent impression on the bowels. It is contra-indicated where there is an inflammatory condition of the digestive canal, hæmorrhoids, prolapsus ani, &c. The great objections to its use, are its tendency to gripe, its nauseous taste, and the large dose in which it must be administered to produce the desired effect. The griping may be much lessened or obviated by combining it with one of the neutral salts and with aromatics; the latter addition also tends to disguise its unpleasant taste. Its purgative powers are increased by combining it with one of the bitters, but as the cathartin is precipitated by gallic acid and tannin, the bitter to be selected should be one containing but little of either of these principles. The decoction of guaiacum is said to answer the same purpose.

Senna is seldom given in powder, the bulk of the dose rendering this form inconvenient. The general mode of administration is in infusion, made with an ounce of the leaves to a pint of water, with the addition of an aromatic, as coriander or aniseed. The dose of this is about four fluid ounces. It is also frequently prescribed in the form of tincture, especially when combined with other ingredients, as the Tincture of Rhubarb and Senna, or Warner's Cordial, so well adapted to cases of constipation, with gastric distress, in persons of gouty diathesis, and accustomed to the use of alcoholic drinks.

Section 3. Chamæsenna, *De Candolle.*—Sepals obtuse. Anthers oblong, with two pores. Legume compressed, dehiscing by somewhat tumid sutures, and having numerous internal partitions; cell pulpless. Seeds vertical, ovate, or somewhat quadrate.

7. C. Marilandica, *Linn.*—Leaflets 8—9 pairs, ovate, oblong, mucronate; petiole with an obovate gland at base. Legume narrow, arcuated, sparsely hispid.

Linn., *Sp. Pl.* 541; Torrey & Gray, *Fl.* 1; Barton, *Veg. Mat. Med.* i. 137; Rafinesque, *Med. Fl.* i. 93; Lindley, *Fl. Med.* 261.

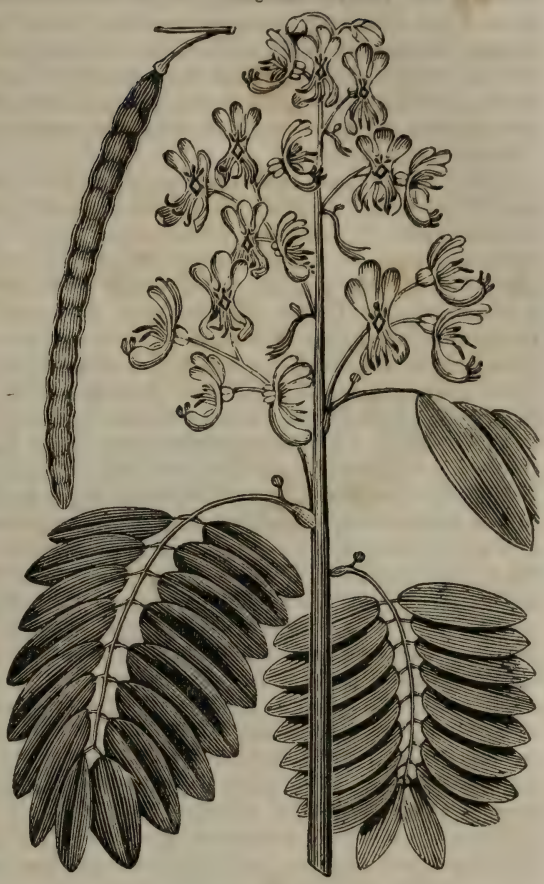
Common Names.—Wild Senna; American Senna, &c.

Foreign Names.—Senné de Maryland, *Fr.;* Marilandische Cassie, *Ger.*

Description.—The Wild Senna is about three or four feet high, with many stems arising from a woody, perennial root. The leaves are alternate, rather long, not numerous, and composed of eight to nine pairs of ovate, lanceolate, entire leaflets, which are smooth, of a green colour above, and a yellowish-green beneath; the common petiole is furnished with an ovate, stipitate gland at base. The flowers are bright yellow, in axillary racemes, on furrowed peduncles; the pedicels are long, glandular, and bracteate. The

petals are unequal, the two lower largest. The stamina have yellow filaments and brown anthers. The legume is pendulous, long, narrow, arcuated, mucronate, blackish, with a few scattered, reddish hairs, and containing many seeds.

Fig. 135.



C. marilandica.

This beautiful and showy plant is found in most parts of the United States, in moist situations, and along water-courses. It flowers from June to the latter part of August. It has attracted some attention as a substitute for the foreign Sennas; and, from the trials made with it, is well deserving of replacing them for most purposes. It has been employed by many practitioners with good effect, and is cultivated by the Shakers to some extent, and it is from them that the shops are usually supplied. The general opinion seems to be, that it is inferior to the Alexandrian Senna, requiring a larger portion to produce the same effect, but of this there is no direct evidence; on the contrary, those who have given it the fairest trial, consider it equal to the generality of the imported article. Much, however, depends on the time of collecting it; if this be done before the seeds begin to ripen, the active principle does not appear to be developed to its full extent; and it is evident, from an inspection of the foreign Sennas, that they are not picked until this time, as the seed-vessels found among them are usually in a mature state. Another cause for the less active properties of the native drug is the absence of the leaves of the argel, always mixed with the Alexandrian, and which add much to its action on the system. The only fair mode of judging of the comparative merits of the two is by making trials of them, free from all extraneous substances. When this is done, it will be found, I am satisfied, that the American Senna is fully entitled to as high a rank as is the Alexandrian or the East Indian, and may be substituted for them in every case with advantage.

A great number of other species of Cassia have been employed in medi-

cine; in fact, they all seem to possess more or less active properties. The *C. alata*, or Ringworm-shrub, of the West Indies, has some reputation in the cure of cutaneous eruptions; for which purpose the juice of the leaves and buds is used; the infusion has been employed as a tepid-bath in the same cases; and the flowers and young leaves, beaten into a pulp, form an excellent poultice for the superficial sores consequent to impetigo and rupia.—(*Macfadyen*, i. 338.)

The *C. occidentalis*, also a species of tropical America, is used for a variety of purposes. The root is diuretic; and, according to Marcgraff, a good alexipharmic. A decoction of the leaves, taken internally, and used externally as a wash, is said to be beneficial in itch, erysipelas, and irritations of the rectum. The negroes apply the leaves, smeared with a little grease, as a dressing to slight sores (*Macfadyen*). In Brazil, where it is known under the name of *Fedegoso*, it is considered to act powerfully on the lymphatic system, to be beneficial in atony of the stomach, and to operate as a diuretic. (Chernoviz, *Form.* 222.) The *C. falcata*, and *C. hirsuta*, are also known by the same appellation, and used in similar cases (*Martius*).

The seeds of *C. absus* are much esteemed in Egypt as a remedy in ophthalmia, for which purpose they are well washed, dried, and powdered; to this powder is added its weight of sugar, and a small quantity of the mixture is blown into the eye, when the first stage of inflammation has subsided; this creates irritation, and a copious flow of tears, with a subsequent alleviation of the disease (Colladon, *Hist. des Casses*, 78). The leaves of *C. tora*, a native of India and Arabia, are used to adulterate *C. obovata*, to which they bear much resemblance. These leaves when fresh are mucilaginous and fœtid-smelling, and are given in India in decoction, in the febrile condition attendant on teething in children; fried in castor oil they are considered a good application to foul ulcers; the seeds ground with buttermilk are employed to ease the irritation of itching eruptions; and the root rubbed up with lime-juice is thought to be very effectual in ringworm. (Ainslie, *Mat. Ind.* ii. 405.) The root of *C. medica*, Velloz, is employed as a substitute for cinchona. (Vogel, *Linn.*, ii. 656.)

The seeds of the *C. auriculata* are considered by Hindoo practitioners as refrigerant and attenuant, and they prescribe them in cases where the system is unduly heated or depraved; they also order them in conjunction with the Indian fig, in diabetes. The powder is used in inflammations of the eye in the same manner as the *C. absus* (*Ainslie*, ii. 31). According to Rheede (*Hort. Malab.*), the bark of the root of *C. glauca* mixed with milk and fresh saffron, is used in Malabar against the gout; the leaves pounded with sugar and milk in virulent gonorrhœa, and the bark in diabetes. The juice of the leaves of *C. sophora*, as well as the fresh root, is reckoned a sovereign remedy in ringworm; it is usually used in conjunction with lime-juice; in Java the leaves are considered to be cathartic (*Ainslie*, ii. 331). Among the species found in the United States, the *C. biflora* is stated by Schoepf to be antisyphilitic, and the *C. chamæcrista* to be purgative.

Tamarindus.—*Linn.*

Calyx tubular at base, bilabiate, upper lip trifid; lower, two-toothed. Petals three. Stamens 9—10; seven short and sterile; others longer, monadelphous. Style one. Legume pulpy within.

There is some difference of opinion among botanists whether this genus is composed of a single species, or whether there are two, one peculiar to the

East, and the other to the West Indies, but the only marked difference between them is in the pod, which is much longer than broad, and many-seeded in the first, and only twice to three times broader than long, and few-seeded in the latter. As the tree is not a native of the West Indies, this difference is probably owing to a variation produced by cultivation and change of climate.

T. INDICA, *Linn.*—The only species.

Linn., *Sp. Pl.* 48; Woodville, iii. t. 166; Stephenson and Churchill, ii. 87; Lindley, *Fl. Med.* 266.

Common Name.—Tamarind tree.

Foreign Names.—Tamarinier, *Fr.;* Tamarindo, *It.;* Tamarindenbaum, *Ger.*

Description.—A large tree with spreading branches, bearing tufts of alternate, abruptly-pinnate leaves, composed of many pairs of smooth, bright-green, elliptic-oblong, sessile, entire leaflets. These leaflets close in the evening, or in cold, moist weather, like those of the sensitive plant. The flowers are in simple racemes, terminating the short, lateral branches; the calyx is somewhat tubular at base, bilabiate, the upper lip three-partite, the lower broad, two-toothed. The petals are three, yellowish, variegated with red veins, ovate, acute, concave, about as long as the calyx. The stamens are ten, of which seven are very short and sterile, and three long, purplish, curved, united at base, bearing large, ovate anthers. The ovary is oblong, compressed, incurved, and supports a subulate style with an obtuse stigma. The legume is oblong, compressed, one-celled, two to twelve-seeded. Those from the West Indies are from two to five inches long, and contain two to four seeds, whilst the East Indian are double this length, and have six to twelve seeds. The seeds are roundish, flattened, hard, polished, and are lodged in a soft pulp.

Fig. 136.

T. indica.
a Set of stamens. *b* Style. *c* Pod.

The tamarind is very common in most parts of the East Indies, and is said to grow in great perfection in Java, and more especially in the island of Madura. It is also extensively naturalized in the West Indies, but the fruit is not equal to the East Indian in the quantity of saccharine matter contained in the pulp, for the latter are preserved without the addition of sugar, whilst this cannot be done with the other. Mr. Crawford states that those exported from one of the Indian islands to another, are merely dried in the sun, but those which are sent to Europe are cured with salt. In India it is deemed dangerous to sleep under this tree, and the observation made by Ainslie that "grass or herbs of any kind are seldom seen growing in such situations, and never with luxuriance," is also applicable to the West Indies.

The part used is the pod; this is sent to Europe from the East Indies, both dried and preserved; from the West Indies, whence the supply for this country is obtained, always preserved. This, says Long (*Hist. Jamaica*),

is done as follows: "The pods are gathered during the summer months, according to their maturity. The pods must be fully ripe, which is known by their fragility, or easily breaking on a small pressure between the finger and thumb. The fruit taken out of the pod, cleared from fragments of shell, is placed in casks, in layers, and boiling syrup from the *tache*, or first copper in the boiling house, is poured in, just before it begins to granulate, till the cask is filled; the syrup pervades every part, quite to the bottom, and when cool, the cask is headed for sale." Dr. Wright (*Med. Plants, Jam.*), says that a better plan is to place alternate layers of tamarinds and powdered sugar in a stone jar.

As found in the shops, tamarinds consist of a soft, dark-coloured pulp, mixed with seeds, and many fibres. They have an agreeable, acidulated taste, and are considered as very cooling, and to assuage thirst; hence travellers, before leaving Cairo to cross the deserts, are always advised to add them to their stores. Vauquelin (*Ann. de Chim.*), found them to contain citric, malic, and tartaric acids, bitartrate of potash, sugar, gum, pectin, and a large quantity of parenchymatous matter.

Medical Properties, &c.—Tamarinds are cooling and laxative, and are therefore often administered in febrile complaints for a double purpose. They are also added to purgative remedies to increase their effects and disguise their taste; but their principal use in this country is as a refreshing drink, for which purpose boiling water is added to them, and when cold, the whole strained to separate the seeds and fibres. Tamarind whey is also a favourite mode of exhibiting this article; this is made by boiling a couple of ounces of the pulp with two pints of milk, and straining.

The Hindoo practitioners use the tamarind-pulp as a laxative, but in Amboyna, according to Rumphius, it is considered injurious where the stomach is disordered, or obstructions in the spleen exist, unless aromatics be conjoined to it. A decoction of the leaves are likewise used by the *Vytians* as an external application, in cases requiring repellent fomentations, and internally, they are employed by the Tamool doctors in jaundice. The stones or seeds are prescribed in the same country in dysenteric complaints, and as they possess much astringency, probably with benefit in the latter stages of the complaint. These seeds, in time of scarcity, are eaten by the poor in India; they are first toasted, and then soaked for a few hours in water, when the hard skin comes off, leaving the bean white and soft; they are said to taste somewhat like the common bean, and are boiled or fried for use.

COPAIFERA.—*Linn.*

Calyx with 4 sepals united at base, ebracteolate. Petals none. Stamens 10, distinct, nearly equal. Style filiform. Legume 2-valved, 1-seeded.

This genus consists of several species of large trees, peculiar to South America, having abruptly-pinnate leaves, with coriaceous, somewhat unequal, ovate leaflets. The flowers are paniculate. But one species was known to Linnæus, and was for a long time thought to be the only source from whence the balsam was obtained. The researches of Martius, Hayne, and others, have recently shown that the species are numerous, and that they all abound in an analogous balsamic juice, and moreover, that it is probable the commercial article is obtained indiscriminately from them all, though the quality differs according to the tree furnishing it, that from the *C. officinalis* being inferior to the others; as this was, however, the first described, and is the type of the genus, it will be noticed in more detail than the others.

1. C. OFFICINALIS, *Linn.*—Leaflets 2—5 pairs, incurved, ovate inequilateral, obtusely acuminated, with pellucid dots.

Linn., *Sp. Pl.* 557; Woodville, iii. t. 37; Stokes, ii. 520; Stephenson and Churchill, iii. 158.

Common Name.—Officinal Copaiva-tree.

Foreign Names.—Le Copaier officinal, *Fr.;* Copaiba, *It.;* Westindischer Copaivabaum, *Ger.*

Description.—A large and handsome tree, with numerous, crooked, small branches and a nearly smooth, brownish-gray bark. The leaves are alternate, pinnated, composed of from two to five pairs of ovate-lanceolate, smooth, inequilateral, coriaceous leaflets, which are not exactly opposite, and are supported on short petioles. The flowers are in axillary panicles at the ends of the branches, and divided into about eight alternate common peduncles; the flowers, which are white, being almost sessile. The calyx is composed of four oblong, acute, spreading, concave sepals, somewhat united at base and tomentose within. The petals are wanting. The stamens are filiform, incurved, somewhat longer than the sepals, and bearing oblong incumbent anthers. The ovary is roundish, compressed and hairy, crowned with a thin incurved style furnished with an obtuse stigma. The legume is ovate, sub-compressed and coriaceous, containing a single elliptical seed.

This species is found in several places in South America, particularly in Venezuela, and also in some of the West India islands. It affords one of the varieties of the Copaiva of commerce, but of inferior quality. Langsdorff (*Travels*) says, in speaking of Saint Catharine's: "The tree which yields copaiva balsam, or balsam of Tolu, *Copaifera officinalis*, is here called *olio breto*, or black olive. It abounds in the forests, but very little use is made of it. I was assured, that when the incision is made to procure the balsam, which is done only in the very hot summer months, a strong sound is heard, and the sap, or balsam, rushes out in a stream, as when a vein is opened in the human arm." The greater part of the balsam imported comes from the different Brazilian ports, but some from Carthagena, Maracaibo, &c., from each of which places it differs in quality; that from Para, generally being the best.

When good, this balsam is clear and transparent, and rather more consistent than olive oil. It is of a pale-yellowish colour, a peculiar, and to most persons a disagreeable smell, and a bitter, pungent, nauseous taste. By age it becomes thicker, until at last it assumes the solidity of a resin. But as before said, much difference exists both as to colour, consistence, and the relative proportions of its constituents. Thus the Para balsam, of good quality, is thin, light-coloured, and limpid, whilst that from the West Indies is in general, thick, dark, and not transparent.

Several analyses have been made of Copaiva by Hoffmann, Stoltze, and Gerber, which show that it contains volatile oil, a yellow resin (*copaivic acid*), and a brown, soft resin; the two first vary in their relative proportions, according to the age and quality of the article, but the resin always forms at least one half of the balsam. When Copaiva is distilled with water, the volatile oil readily passes over. Nitric acid acts on it with much energy; when mixed with magnesia, the copaivic acid unites with the magnesia, forming a copaivate of that base, which has considerable consistence; this property is not peculiar to copaiva, as some of the terebinthinæ act in the same manner, and sometimes when the balsam is apparently of the best quality, no solidification takes place on the addition of the alkali. It is stated by Dr. Cooke (*Journ. Phil. Coll. Pharm.* v.), that the best test for its purity, or its capacity for solidifying, is in its perfect solubility in Spts. Etheris Nit. fort. He says

that he has always been successful in making solidified copaiva with balsam that would dissolve in that menstruum, but always failed where the reverse was the case. He adds that the test proposed by Gerber, and also by Planche, of solution in caustic ammonia, is insufficient and not to be relied upon.

Medical Properties, &c.—Balsam of Copaiva, like the other oleo-resins, is stimulant, diuretic, and cathartic. It appears, however, to exert more influence on the urinary passages than the other articles of its class, and has, in consequence, been much used in diseases of these parts. An old writer on Materia Medica (Fuller, *Dispensatory*), says of it: "It wonderfully deterges the reins, ureter and bladder when obstructed with sand, mucus or pus; strengthens them when relaxed, and heals them when ulcerated. It provokes urine, extinguishes its heat, and cleanses off its bloody, foul, and purulent contents more effectually than anything I ever met with." When the balsam is taken internally, it is absorbed, and some of the oil passes out of the system by the lungs, as the odour of it is very marked in the breath; it also passes off by the urinary passages, as is manifested by the heightened colour of the urine, and the odour communicated to it. It often creates nausea and vomiting, even in small doses, and any long-continued use of it impairs the digestive function in a striking degree. In large doses it acts as an irritant to the gastro-intestinal mucous membrane, giving rise to heat, nausea, vomiting, griping, and severe purgation.

The principal employment of copaiva is in mucous discharges from the genito-urinary organs, and especially in gonorrhœa, but there is much difference of opinion as to its exact powers in this complaint, and to the time or stage of the disease to which it is most appropriate; some writers recommend that it should be given at the very commencement of the disease, without any preliminary treatment, whilst others, on the contrary, assert that it is injurious, except when the violence of the inflammatory stage is subdued by appropriate remedies. The first of these plans is very commonly resorted to in this country, and has, in some cases, been productive of unpleasant results, at the same time it must be stated that empirical as such treatment must appear, it is more successful than where the balsam is employed at a later stage of the complaint. In all stages, the copaiva is more successful in gonorrhœa in males than in females; this is accounted for by the fact, that except at the very commencement of the disease, and oftentimes even then, the vagina is more affected than the urethra.

Copaiva has also been much employed in chronic inflammation of the bladder, and in some obstinate forms of chronic bronchitis, spasmodic asthma, and hooping cough, either alone or in combination with opium and ipecacuanha. In old inflammations of the lower intestines, it has proved beneficial, and according to Cullen, it gives great relief in hæmorrhoidal affections.

Copaiva is given in a variety of forms, either dropped on sugar, or floated on water, with the addition of a few drops of bitter tincture to disguise the taste, or in emulsion made of white of egg or mucilage, flavoured by some aromatic, or with the addition of sweet spirits of nitre. When combined with liquor potassæ, its effects in gonorrhœa are much increased. It is also given in pills made of the balsam solidified, by means of magnesia, but since the invention of the gelatine capsules, the usual form of administration is in an unmixed state, enclosed in these coverings, by which the nauseous odour and taste are completely removed. The dose of copaiva is from twenty drops to a drachm, or more.

Numerous other species have been described by Hayne and others, but only five are recognised by De Candolle, in his Prodromus.

2. C. LANGSDORFFII, *Desfontaines.* – Leaflets 3—5 pairs, equal sided, obtuse, with pellucid dots; the petioles and peduncles slightly downy.

Fig. 137.

C. langsdorffii.

This species, and *C. coriacea*, Martius, are found in the Provinces of San Paulo, and Minas, in Brazil, and afford the best balsam which comes from Rio Janeiro, though other species also contribute their quota, as all those growing in hot and moist situations yield a good product, and in large quantities, whilst those in drier and more inland localities afford a smaller proportion, but of a more resinous character.

3. C. CORIACEA, *Martius.*—Leaflets 2—3 pairs, elliptical, equilateral, emarginate, coriaceous, not dotted, smooth on both sides, somewhat glaucous beneath. Bahia, San Paulo, and Minas.

4. C. GUIANENSIS, *Desfontaines.*—Leaflets 3—4 pairs, ovate-elliptic, smooth, mucronate, with pellucid dots. Rio Negro, Para, and Guiana.

5. C. MULTIJUGA, *Hayne.*—Leaflets 6—10 pairs, ovate-lanceolate, acuminate, mucronate, with pellucid dots. Para. This is said to afford a very excellent balsam.

Besides these, Hayne enumerates the *C. beyrichii*, *C. Martii*, *C. Jussieui*, *C. nitida*, *C. laxa*, *C. cordifolia*, *C. sellowii*, and *C. oblongifolia*, as all producing balsam of different degrees of purity. He is of opinion that the species mentioned by Piso (*Med. Bras.*), was the *C. bijuga*. De Candolle notices a tree affording this balsam, and said to inhabit the island of Mauritius, under the name of *C. disperma*, but it is very imperfectly known, and it is probable that there is some mistake as to its habitat.

Sub-order 3. MIMOSEÆ.—Corolla valvate in æstivation.

The most general characteristics of this group are astringency in the bark, and the production of a gum. The bark of most of them is astringent and tonic. In some species of *Acacia*, it abounds so much in tanning principles as to become an object of commercial importance. But this property is not confined to the bark alone; in *A. catechu* the heart-wood contains a valuable astringent substance, called Catechu, which is obtained by boiling and evaporating. Several of the *Ingas* are astringents of a similar nature.

The gums are principally the product of species of *Acacia*, but are also afforded by other plants of the group. Some are emetic, as the *Entada pursætha* of Java; others are purgatives. This is the case with the pulp of the pods of *Inga vera* and *I. fœculifera*. A few are poisonous, among which are the roots of several species of *Mimosa*. The *Inga unguiscati* is said to be a good remedy in urinary complaints and obstructions of the liver and

spleen. A decoction of the bark is very astringent, and has also the reputation of acting as a diuretic. (*Macfadyen*, i. 306.)

Many produce edible fruit or seeds, among which may be noticed *Parkia africana*, the seeds of which are much used in Africa (Brown, *Append. Denham and Clapperton*). Those of the *I. camatchili* are also esteemed in Manilla for the agreeable pulp that surrounds them. (Perrotet, *Ann. Soc. Lin.*) The bark of some species, as *Algarobia*, afford an intoxicating liquor when distilled with sweetened water; and finally, the wood of many of these plants is very useful in the arts.

Acacia.—*Willdenow.*

Flowers polygamous, bisexual and male. Calyx 4—5-toothed. Petals 4—5, free or cohering to form a 4—5-cleft gamopetalous corolla. Stamens indefinite. Legume continuous, juiceless, 2-valved.

This extensive genus, which contains upwards of two hundred and fifty species, formerly constituted part of *Mimosa;* but was separated by Willdenow, with many others, from that heterogeneous group. It is composed of trees and shrubs, of various habit and foliage, with stipular or scattered thorns, or unarmed. The flowers are yellow, white, rarely red, capitate or spiked, and are decandrous, polyandrous, or monadelphous. It is still a chaotic mass of ill-defined species, and requires much revision.

1. A. catechu, *Linn.*—Thorns stipular; leaves pubescent, bipinnate; pinnæ 10—30 pairs; leaflets 30—50 pairs; petiole with a large gland below the first pinnæ, and another near extremity; spikes cylindrical; legume flat, thin, straight, 4—8-seeded.

Linn., *Suppl.* 409; Woodville, iii. 433; Stephenson and Churchill, ii. 76; Willdenow, *Sp. Pl.* iv. 73.

Common Names.—Catechu, Catechu Acacia.

Foreign Names.—Cachou, *Fr.;* Catto d'India, *It.;* Katechubaum, *Ger.*

Fig. 138.

A. catechu.
1. Stamens. 2. Legume.

Description.—A small tree, fifteen or twenty feet high, with a thick, scabrous, ferruginous bark, which is red within, very astringent, and somewhat bitter. The branches are irregular, and more or less pubescent when young; the older ones beset with numerous stipular prickles, in pairs and recurved. The leaves are alternate, and composed of from ten to thirty pairs of pinnæ, each having numerous small, linear leaflets, covered with short hair, and of a pale-green colour. The common petiole is sometimes armed on the lower side with a few recurved prickles, and bears a gland below the lower pair of pinnæ, and another near the extremity. The flowers are hermaphrodite and male, numerous, axillary, in slender cylindrical spikes, of a pale-yellow colour. The calyx is tubular, hairy, and 5-toothed. The corolla is composed of 5 petals, united into a tube at base, and is much longer than the calyx. The stamens are numerous, with roundish

anthers. The ovary is oval, supporting a slender style, and terminated by a simple stigma. The legume is straight, smooth, and pointed, containing six or eight roundish seeds.

The Catechu-tree is found in several parts of India, and affords one of the articles known in commerce under the name of Catechu, Terra Japonica, &c. This was formerly supposed to be an earth derived from Japan, and its true origin was first pointed out by Mr. Kerr (*Med. Obs. and Inquir.* v.) It is an extract prepared from the wood of this tree, and the process of making it is thus described by Mr. Kerr and others. The sap-wood is all removed, and the heart or coloured portion cut into small chips, and placed with water in earthen pots in an oven or fire-place, and the fluid evaporated to one-half, and then strained into earthen pots, and further evaporated till it becomes somewhat consistent, when it is poured into clay moulds of a square form, or placed on mats, and cut into a quadrangular shape by means of a string, and then completely dried in the shade.

This forms one of the many kinds of Catechu found in commerce, and is the best, especially when light-coloured. There are two varieties, in square cakes, one much darker and inferior to the other, but both probably from the Acacia; but, besides these, there are some twelve or fifteen others, differing in appearance and quality, the origin of many of which is wholly unknown; most of them, however, coming from the East Indies. These have been ably investigated by M. Guibourt (*Hist. des Drogues*), and Dr. Pereira (*Elements Mat. Med.*), and shown partly to be derived from the *Areca catechu*, partly from the *Uncaria Gambir*, but generally are of unknown origin. These various products differ much in the form of the pieces and their envelopes, as well as in their quality; some being almost pure, whilst others contain a large proportion of earthy matter, or other impurities. For an account of the various kinds of Catechu in the Paris drug market, a paper by M. Guibourt, in the *Journ. Phil. Coll. Pharmacy*, iv. 49 (from *Journ. de Pharm.*), may be consulted with advantage; and I may mention that most of these varieties, and some not mentioned by him, may be occasionally found in our shops.

Catechu has often been analyzed; the best consists of one-half of Tannin, and one-third of a peculiar extractive, which has received the name of Catechine, to both of which it owes its peculiar properties. Catechu is applied to various purposes in the arts, and is largely employed in the East, when mixed with the Betel-nut, for chewing, a practice almost universal throughout the Indian continent and islands.

Medical Properties, &c.—Catechu is a powerful astringent, much resembling the extract of rhatany in its effects, and is an extremely valuable article of its class, and may be advantageously employed in all cases where it is wished to restrain immoderate discharges, where these are not attended with inflammatory action, or produced by congestion. It is used in affections of the mouth and throat, especially where there is a debility or relaxation of the parts, as in relaxed uvula and in loss of voice. In form of lozenges, mixed with gum arabic and sugar, it has been found very useful to persons who have occasion to speak long in public, as it diminishes or prevents the hoarseness consequent to too great exercise of the vocal organs; it has also proved useful in an aphthous condition of the mouth and scorbutic affections of the gums. As a topical application to ulcers it is sometimes beneficial, where they are of a phagedenic character. "In India," Mr. Kerr says, "the extract is a principal ingredient in one of their ointments of great repute; composed of blue vitriol four drachms, catechu four ounces, alum nine drachms, white resin four ounces; these are reduced to a fine powder, and mixed with the

hand, adding olive oil ten ounces, and water sufficient to bring the mass to a proper consistence for an ointment. This is used in every sore from a fresh wound to a venereal ulcer."

2. A. VERA, *Willdenow.*—Spines in pairs, subulate. Branches and petioles glabrous. Leaves bipinnate; leaflets 10—20 pairs. Legume moniliform.

Linn., (*M. nilotica,*) *Sp. Pl.* 1506; De Candolle, *Prod.* ii. 461; Stephenson and Churchill, ii. 77; Lindley, *Fl. Med.* 296.

Common Names.—Egyptian Thorn; Egyptian Gum Arabic Acacia.

Foreign Names.—Acacie d'Egypte, *Fr.;* Acacia Egiziana, *It.;* Egyptische Acacia, *Ger.*

Description.—A middle-sized tree, with a crooked stem, covered with a smooth gray bark; that of the branches is yellowish-green or purplish. The leaves are alternate, bipinnate, composed of two pairs of opposite pinnæ, with numerous small, oblong, linear leaflets, with a gland between the pinnæ. The flowers are bright yellow, and collected in globular heads about two together, upon axillary peduncles, and furnished with two small bracts. The legume is four or five inches long, moniliform, nearly flat, smooth, of a pale-brown colour, and contracted into numerous orbicular portions, in each of which is lodged a flattish seed.

This tree grows in several parts of Africa and in Arabia, where it is associated with other species yielding similar products.

It was originally referred by Linnæus to *Mimosa*, under the name of *nilotica;* but with many others, was formed into the genus *Acacia* by Willdenow, and called *A. vera*, as the Linnæan species included not only this species, but some others; it is very closely allied to the *A. arabica*, and, in fact, Ehrenberg considers this latter as merely a variety of it. This furnishes a fine quality of Gum Arabic, and also some Gum Senegal.

Fig. 139.

A. arabica.

3. A. ARABICA, *Willdenow.*—Spines in pairs. Branches and petioles pubescent. Leaves with 4—6 pairs of pinnæ. Leaflets 10—20 pairs, oblong, linear. Legumes moniliform.

Willd., *Sp. Pl.* iv. 1084; Lamarck, *Dict.* i. 19; (*A. nilotica,*) Delille, *Ill. fr. Egypt.* 31; Lindley, *Fl. Med.* 269.

Description.—A small tree, with pubescent branches and petioles. The leaves are bipinnate, in four to six pairs, composed of from ten to twenty pairs of oblong, linear leaflets, with a gland on the common petiole, below the first, and generally one between the last pair of pinnæ. The flowers are yellow, in globose, pedunculated, axillary, subternate heads. The legume is moniliform, but the orbicular portions are said not to be as well defined as in the *A. vera.*

This species is a native of Africa, Arabia, and India, and like the last, furnishes Gum Arabic and part of the East Indian gum.

3. A. GUMMIFERA, *Willdenow.*—Spines straight. Branches smooth. Leaves with 6 pairs of obtuse, linear leaflets, with a gland between them. Flowers in axillary, oblong spikes. Legume sub-moniliform, tomentose.

Willd., *Sp. Pl.* iv. 1056; De Candolle, *Prod.* ii. 455; *Sassa gummifera*, Gmel.

This species grows in Egypt, and about Mogadore in Morocco. It is

stated by Forskäl to afford a gum, which is gathered by the Arabs. Dr. Pereira thinks that what is called Barbary gum is in part at least, the product of this tree, and Dr. Lindley says that it is by no means certain that Gum Sassa is not produced by it.

Besides these, it is stated on good authority, that several other species not only secrete an analogous juice, but that a large portion of the gum of commerce is derived from them: these are—

4. A. SEYAL, *Delille.*—A native of Egypt and Senegambia. This yields part of the gum senegal. This gum occurs in white, hard, vitreous, reniform pieces.

5. A. SENEGAL, *Willdenow.*—Is found in Arabia and in Africa, from Senegal to the Cape of Good Hope. It produces gum senegal. It is *A. verek.* Adanson.

6. A. TORTILIS, *Forskäl.*—A native of Arabia; the gum is collected by the Arabs, and is said to be of very fine quality.

7. A. EHRENBERGII, *Hayne.*—Also a native of Arabia, and affords a product like the last.

All these species, and probably many others, are exceedingly similar in their appearance and habits, and the gum from them is almost identical, varying more in appearance and purity, than in composition and uses. The Acacia and its product has been known from the earliest antiquity. The Shittim tree, mentioned in several places in the Old Testament, is generally supposed to have been an Acacia. The author of the notes to the Pictorial Bible (i. 202) is of opinion that it was *A. horrida*, and Dr. Carpenter to be *A. vera.* Hippocrates also speaks of the Acacia under the names of Egyptian thorn and white thorn, and likewise mentions the gum as useful in medicine. Pliny alludes to a tree under the name of *Spina sitiens*, which there is reason to believe was a species of this genus. It was of course well known to the Arabian physicians.

There are numerous varieties of gum found in commerce, known under the names of Gum Arabic, Gum Senegal, Barbary Gum, East India Gum, Cape Gum, &c., all possessing the same characteristics, the finer portions of them being sold as Gum Arabic, a full account of which will be found in Guibourt, *Histoire des Drogues*, and a good synopsis of their peculiarities in Pereira, *Elements Mat. Med.* ii. 579, &c.

Gum flows naturally from the gum-bearing Acacias at certain seasons of the year, principally during the hot months; but to increase the discharge, incisions are also made. Jackson (*Morocco*, 137) says, "that the more sickly the trees appear, the more gum they yield, and the hotter the weather, the more prolific it is." In Senegal, Adanson, however, says that the greatest flow is during the rainy season.

As found in the market, Gum Acacia is in tears or fragments of different sizes, wholly inodorous, but with a slightly sweetish, mucilaginous taste. These may be transparent and colourless, or opaque and dark-coloured, or with any of the intermediate characters. Gum dissolves both in hot and cold water, forming a mucilage. It is insoluble in alcohol, which precipitates it from its watery solution. According to the analysis of Guerin and others, Gum Acacia is composed of about three-fourths of soluble gum or *Arabine*, the rest being water, &c. When pure, it contains no *Bassorine*, so large a constituent of Gum Bassora, the product of an unknown plant.

Medical Uses, &c.—Gum is employed as a demulcent, and as an article of diet in cases of irritation of the alimentary canal. Although from its mildness, it causes no uneasiness to the digestive organs, it is very nutritious, and in fact it forms a very large constituent of many kinds of vegetable food. But

even alone it is capable of supporting life, in quantities not exceeding a few ounces daily. It is said to be a common article of food in some parts of Africa, and Hasselquist mentions a caravan of more than a thousand persons, who having exhausted their provisions, were supported for two months on the gum they were carrying as merchandise.

Many other species of Acacia have properties deserving of notice. The bark of *A. ferruginea* is very astringent, and when added to sugared water, forms an intoxicating drink. The wood and resin of A. örfata are employed by the Arabs as a fumigation in epilepsy, and the leaves prevent milk from turning sour for some days. (Forskäl, *Fl. Arab.* 177.) The bark of *A. leucophlœa* is similar in its properties to that of the *A. ferruginea*. Several of the Australian species furnish a kind of Catechu, as the *A. mollissima*, *A. decurrens*, and *A. melanoxylon*.

Group XVIII.—Rosales.

Order 45.—ROSACEÆ.—*Jussieu.*

Calyx 4—5 lobed, with a disk lining the tube, or surrounding the orifice. Petals 5, perigynous. Stamens indefinite or definite, arising from the calyx, just within the petals; anthers innate, 2-celled, dehiscing longitudinally. Ovaries superior, solitary, or several, 1-celled, sometimes forming a many-celled pistil; ovules 2 or more, anatropal, suspended, rarely erect; styles lateral; stigmas usually simple. Fruit either 1-seeded, nuts, or acini, or follicles containing several seeds.

The species of this order are herbaceous or shrubby, with simple or compound alternate leaves, often with two stipules at base, and occasionally dotted. They are principally natives of the temperate and cool climates of the northern hemisphere. None of them bear poisonous fruits, these products being in many cases palatable and salutary. The bark and roots are usually astringent and tonic. Thus the root of *Potentilla* has been used for tanning; *Geum* and *Comarum* are excellent tonics, as is also *Agimonia;* most of the *Spiræas*, and several species of *Rubus*, are much employed as astringents. But other properties also exist; for example, the roots of *Gillenia* are emetic and diaphoretic, and one of the most powerful anthelmintics known, is afforded by the *Brayera anthelmintica*, a native of Abyssinia, whence it is exported to Egypt, Turkey, &c., and used with much success against the tape-worm. It was first described by Dr. Brayer (*Notice d'un Nouv. Pl., &c.*, 1823), and the genus named after him by Kunth. The part used is the flowers, four or five drachms of which are made into an infusion with twelve ounces of water; this is divided into two doses, and given at the interval of an hour; it purges severely, and is said to destroy the worm in almost every case. Some of the barks are endowed with saponaceous qualities; the most remarkable is *Quillaja saponaria*, which is used in some parts of South America as a substitute for soap; it is said to remove all kinds of spots and stains, especially from woollens, and form an excellent wash for the hair, imparting glossiness, and preventing its falling out.

Section 1. Rosidæ.—Calyx tube fleshy, covering the achenia.

Rosa.—*Linn.*

Calyx pitcher-shaped, 5-cleft, finally fleshy, contracted at the neck. Achenia numerous, hispid, affixed to the inner side of the tube of the calyx. Stipules adnate to the petiole.

This genus is very extensive, containing upwards of 150 species, and almost innumerable varieties. They are all shrubby and prickly plants, with pinnate leaves, sometimes, but rarely, reduced to a single leaflet. They are, with scarcely an exception, found in the northern hemisphere, and between 20° and 70° latitude. The greater portion are natives of Europe and Asia; in North America, according to Torrey and Gray, there are about 15 species, but Rafinesque, in a monograph on the subject (*Ann. Sci. Phys.* v.), extends the list to more than double this number. In Africa, there are very few species found. Those of Europe, North America, and Northern Asia are very closely allied, but the Chinese and Indian have a totally different habit and aspect. In a work of the character of the present, it would be out of place to dwell on the history and attributes of this "queen of flowers," but a few general observations may be allowed.

The name is supposed to be derived from the Celtic *rhudd* or red, or *ros*, from whence also are derived the names of a number of other plants, as *Rhus*, *Rubia*, *Rubus*. The rose has been cultivated from the earliest ages, as even in the times of Herodotus and Theophrastus, the flower had become doubled; and Pliny speaks of several kinds, among which is the Sweet briar and Hundred-leaved rose. In consequence of this long attention to it, the varieties have not only become almost interminable, but it is utterly impossible to trace them back to their original stocks. Numerous and magnificent works have been published on this genus, but no two of the writers agree in their opinions as to either varieties or species.

Some of these plants are recognised as medical by the different authorities, but their qualities are rather those of a negative than of a decided character, and the preparations from them are more employed as excipients and for flavouring and aromatising, than as remedial agents.

1. R. GALLICA, *Linn.*—Leaflets rigid, elliptical, smooth. Prickles unequal. Calyx ovate, finely glandulose, hispid. Fruit sub-globose, coriaceous.

Linn., *Sp. Pl.* 704; Redouté, *Les Roses*, i. 73, 135, &c.; Stephenson and Churchill, ii. 99; Lindley, *Mon.* 68.

Common Names.—Red Rose; French Rose; Provence Rose.

Foreign Names.—Rose de Provins, *Fr.;* Rosa domestica, *It.;* Essigrosen, *Gr.*

Description.—In a cultivated state it is about three feet high, the creeping roots sending up many stems, armed with fine, short, straight prickles. The leaves consist of two or three pairs of leaflets, with a terminal one, on very short petioles; they are ovate, rigid, doubly serrate, smooth, of a dark shining green above, and pale and downy beneath. The stipules are linear-lanceolate, pointed, entire, downy, and glandular. The flowers consist of a few spreading petals, of a deep and peculiar red tint, golden-yellow at base. The segments of the calyx are downy, and sometimes fringed at the margin with a row of linear-lanceolate leaflets. The stamens have roundish, yellow anthers. The fruit is subglobose, and of a pale crimson colour.

This species is a native of the south of Europe, but is common in our gardens, flowering in June and July. A great number of varieties have been described and figured by writers, some of which are very unlike the original species. The parts used are the petals of the buds, deprived of their white claws. These leaves are much more astringent than those of the flower when fully expanded. When dried, they have a purplish red colour, an agreeable odour, and a bitterish and astringent taste. The colour is destroyed by the action of light and air, and they should therefore be kept in close boxes or canisters. They contain tannin, gallic acid, volatile oil, a peculiar colouring matter, some salts, &c.

Medical Properties.—They are a very mild astringent, but sometimes act as a laxative. These properties, however, are of very little importance, as their principal use in pharmacy is as a colouring ingredient in certain mixtures. The infusion, with the addition of sulphuric acid, is an agreeable refrigerant and astringent in some cases. The confection is a very common pill basis, and it is for this purpose that the article is principally employed.

2. R. CENTIFOLIA, *Linn.*—Prickles unequal, large, somewhat curved. Leaflets glandular at the margin. Flowers somewhat drooping. Calyx glandulose, hispid. Fruit oblong.

Linn, *Sp. Pl.* 704; Redouté, *Roses*, i. 25, 37,. &c.; Stephenson and Churchill, l. c.; Lindley, *Mon.* 64.

Common Names.—Cabbage Rose; Hundred-leaved Rose, &c.

Foreign Names.—Rose à cent feuilles, *Fr.;* Rosa centifoglie, *It.;* Die Centifolienrose, *Gr.*

Description.—It is impossible to draw up a description of this rose that would be applicable to all its varieties. It may be generally stated that it is a taller plant than the *R. gallica*, and that the edges of the leaves are furnished with minute glands, and that its fruit is more or less elongated. De Candolle admits of seventeen distinct varieties, but upwards of a hundred are cultivated in the gardens; of these varieties the most striking is the Moss Rose, so highly esteemed for the beauty of its half-expanded flowers.

Although this is the officinal species, the petals of almost every other cultivated rose are employed for the purposes for which it is designated. Lindley is of opinion that it is a native of Asia; but it is generally stated to be indigenous to the south of Europe, and Sir J. E. Smith considers it as a mere variety of *R. gallica.* The parts used are the petals of the fully-expanded flowers, well dried, or preserved by means of salt. Their taste is sweetish, yet acidulous and bitter. They contain a volatile oil, gallic acid, a sweet extractive, colouring matter, &c. Their principal use is for the preparation of Rose water, and the volatile oil well known under the name of Attar of Roses. The fragrance of the Rose, although extremely pleasant to most persons, acts injuriously in some cases; and numerous instances are recorded where it caused grave accidents.

Rose water, so much used as a perfume and flavouring ingredient, and also in some pharmaceutical preparations, is obtained by distilling eight pounds of Rose leaves, with two gallons of water, and drawing off a gallon. This requires to be redistilled, or some alcohol added to it to preserve it; for pharmaceutical purposes the first is the best plan, as the addition of the spirit renders it unfit for some medicinal uses.

The attar of roses is prepared in Persia and other Asiatic countries; but, with all the aid of science, very little of it can be obtained in Europe. In the Asiatic Researches, Colonel Polier has thus described the mode of its preparation. Forty pounds of roses, with their calyces, are put in a still with sixty pounds of water. The mass being well mixed, a gentle fire is put under the still; and when the fumes begin to rise, the cap and pipe are properly fixed and luted. When the product begins to come over, the fire is gradually lessened, and the distillation continued until half the water has distilled off; this requires four or five hours. This is to be poured upon another forty pounds of roses, and above twenty pounds of product drawn off. This is poured into pans, and left exposed to the air for a night. The attar is found congealed and floating on the surface in the morning, when it is carefully removed; when a certain quantity is obtained, it is cleared of any water and impurities. The remaining water is used for fresh distillations. The quantity of attar thus produced is very small, as, under the most favourable cir-

cumstances, not more than a drachm and a half is obtained from the eighty pounds of roses.

The attar, as found in commerce, is seldom pure, being frequently adulterated with the oil of sandal-wood, or with an oil procured from a sweet-scented grass, or even with spermaceti. These may all be detected, from the attar being congealed by common cold, which the adulterating additions are not. This oil is obtained from many species of the sweet-scented roses; it is generally imported from Turkey, though some comes from India.

Medical Properties.—The petals of the Cabbage-rose are slightly laxative, and a syrup is prepared from them, which is administered to children as a laxative, but is seldom used in this country. Rose-water is employed as a lotion, collyrium, &c., and enters into the composition of some ointments; but it is more on account of its pleasant odour than for any medical properties it possesses. Its principal use is as a perfume.

Several other species of Rose are officinal in Europe; among which the common Wild Rose, *R. canina*, is most used. The pulpy part of the fruit of this, is somewhat astringent, and is beaten up with sugar into a confection, which enters into the composition of several electuaries, and was formerly much esteemed in the treatment of dysentery. It is also used as an article of dessert; and in Germany a sauce is prepared from it, somewhat like that of the tomato. The root was at one time much celebrated in hydrophobia, whence its specific name of *canina*. The Tartars use the leaves in place of tea, and a spirit is prepared from the flowers by fermentation.

Section 2. POTENTILLIDÆ.—Calyx tube herbaceous. Fruit a heap of achenia.

RUBUS.—*Linn.*

Calyx concave, or flattish at base, naked, 5-cleft. Petals 5, deciduous. Stamens numerous, inserted in the calyx. Achenia numerous, pulpy, aggregated on a conical or cylindrical spongy torus. Styles terminal, or nearly so.

A very extensive genus, composed of perennial shrubby, or suffruticose plants, with erect or procumbent stems, which are usually prickly and biennial. The leaves are pinnately or pedately compound. The flowers are either white or reddish, succeeded by an eatable fruit, which is black, red, or sometimes yellowish, and well known under the names of Blackberry, Dewberry, Raspberry, &c. It is a very widely dispersed genus of upwards of a hundred species, the greater part of which are found in temperate or cold climates. Several species are officinal, among which two of our native species deserve particular notice.

1. R. VILLOSUS, *Aiton.*—Pubescent, hispid, and prickly. Leaves 3—5 foliolate. Folioles ovate, oblong, acuminate, serrate, pubescent. Stems and petioles prickly. Calyx short, acuminate. Racemes loose. Pedicels solitary.

Aiton, *Hort. Rev.* ii. 210; Torrey and Gray, *Fl.* i. 454; Bigelow, *Med. Bot.* t. 38; Barton, *Veg. Mat. Med.* ii. 151.

Common Names.—Blackberry, High Blackberry, &c.

Description.—The root is horizontal, irregularly tuberous, perennial, woody, of a reddish-brown colour. The stems are biennial, from three to seven feet high, somewhat shrubby, of a brownish colour, and armed with strong, curved prickles. The smaller branches and new shoots are decumbent, herbaceous, greenish, and are pubescent as well as prickly. The leaves are ternate and quinate, oval, acuminate, finely and sharply serrate, villous on both sides. The petioles are hirsute and prickly. The flowers are white, large, in terminal panicles or racemes, and consist of a 5-petalled corolla and numerous

stamens; the filaments of the latter are slender, and the anthers small. The fruit is large, at first green, then red, and finally black.

There are several varieties, as regards the mode of growth and appearance of this plant; sometimes it is tall and erect, and at others it is weak and procumbent, and the racemes of flowers are sometimes leafy. It is found in most parts of the United States, in old fields, edges of woods, &c., and in all kinds of soil. It flowers in May and June, and ripens its fruit in August. The fruit varies exceedingly in size and flavour, and the finer kinds, if cultivated, would probably be much improved. The root is officinal in the U. S. Pharmacopœia; as found in the shops, it is in pieces of various sizes, of an ash-brown colour externally, and yellowish-white within. Its odour is faint, and its taste astringent and bitter; this is confined to the cortical portion as the woody fibre is destitute of any virtues. No analysis has been made of this root, but it is known that the active qualities are dependent on the presence of tannin and some bitter extractive.

Medical Properties.—Blackberry root is an efficient astringent, though not of great power, and has been found exceedingly useful in bowel complaints, especially in the cholera of children. No article of the Materia Medica is more relied upon in domestic practice in the country, than a decoction of this root, under the name of Blackberry tea; and although it has been much overrated, and virtues attributed to it which it does not possess, there is no doubt that it is a very useful remedy in certain cases, where mild astringents are indicated. It is generally given in decoction, made with about an ounce of the root to a pint of water, of which the dose for a child is two or three teaspoonsful, and for an adult a wine-glass full, several times a day. This decoction is somewhat bitter, but is not disagreeable; it is, however, much improved by the addition of a little orange peel to it.

The fruit, which agrees with most persons, is considered as beneficial in dysentery, especially in the form of a jam or syrup; and there is strong evidence of its good effects in this disease. It is exceedingly grateful to the patient, and often relieves the painful tenesmus so constantly an attendant of the complaint. A jelly made from the unripe fruit, at the time it is red and acid, is said to be advantageous in gravel, but there is no corroboration of the statement from any authentic source.

2. R. CANADENSIS, *Linn.*—Stem shrubby, ascending at base, trailing or procumbent, prickly, leaves 3—6 foliolate, glabrous or pubescent, leaflets oval, rhombic ovate, or almost lanceolate, mostly acute or acuminate, membranaceous, sharply and unequally serrate, often somewhat incised. Petioles and peduncles naked or armed with bristly prickles. Stipules linear, entire, or serrate. Flowers racemose or somewhat corymbose, with leafy bracts, the lower peduncles distant, the upper crowded. Petals twice the length of the sepals. Fruit large and black.

Linn., *Sp. Pl.* 494; Torrey and Gray, i. 455.
Common Names.—Low Blackberry; Dewberry.

This is the species which is generally known under the name of Dewberry, and is the *R. trivialis* of most American botanists and of the Pharmacopœia, but is not the species described under that name by Michaux; this latter is a native of the Southern States, and ripens its fruit at a time when the more northern *R. canadensis* is first coming into flower. The species in question very closely resembles the procumbent varieties of *R. villosus*, and can scarcely be distinguished from them. The fruit ripens in July and August, and in general is more juicy and higher flavoured than the Blackberry; but, as with that fruit, there is much variation. The root is officinal, under the name of *R. trivialis*, in the U. S. Pharmacopœia; it closely resembles that

of the *R. villosus* in every respect, and is given in the same cases; some persons deem it more effiacious, but there is no evidence of any difference in power between them.

Fragaria.—*Linn.*

Calyx inferior, 10-cleft, 5 of the segments alternately smaller. Petals 5. Receptacle succulent or pulpy, and deciduous, with dry achenia scattered over its surface. Styles lateral, with depressed stigmas.

The Strawberries are perennial, stoloniferous herbs, with tri-foliolate leaves, found in most parts of the world, in cool climates. The species are very difficult to define, as they all have the same habit and flowers, differing only in some less important details. If every deviation of form, colour, pubescence, &c., is to be considered specific, the species would be infinite. Linnæus and many other botanists considered that there was but one; but at present some fifteen or twenty are recognised, of which three are noticed by Torrey and Gray as natives of North America.

F. vesca, *Linn.*—Fruit conical or hemispherical, the achenia superficial. Calyx spreading, or reflexed in fruit. Peduncles usually longer than the leaves; direction of the pubescence variable.

Linn., *Gen.* 633; Torrey and Gray, i. 448; *English Bot.* 1524; *Flor. Med.* iii. 169.

Common Names.—Strawberry; Garden Strawberry.

Foreign Names.—Fraisier, *Fr.;* Erdbeer, *Ger.;* Fragola, *It.*

Description.—Root perennial, creeping, knotty. Stems procumbent and stoloniferous, and upright and reclined, short. Leaves cauline and radical, the latter on long petioles, tri-foliolate. Leaflets sessile or nearly so, oboval, oval or nearly round, deeply serrated, hairy; the former nearly similar, but smaller, both with lanceolate, oblong, acute stipules. Flowers from one to many, with erect or drooping pedicels. The calyx is spreading or reflexed, divided into ten acute segments, the alternate one being somewhat shorter. The petals are five, white, oboval or obcordate, inserted on the calyx. Stamens indefinite, small, and also inserted on the calyx. Ovaries many, with each a small sessile stigma, inserted on a succulent gynophore, which increases in size, becomes coloured, and forms the fruit.

Fig. 140.

F. vesca.

This species is found in Europe and this country, and presents innumerable varieties; it is one of those cultivated in gardens. It flowers from April to May, and ripens its fruit in May and June.

Medical Uses. — The fruit is freely used as a dessert, and for flavouring syrups, &c., but is also said to possess medicinal qualities. Gesner speaks of its good effects in calculous disorders, and Linnæus extols its efficacy in gout, having, he states, pre-

vented paroxysms of it in himself, by partaking of this fruit very freely. They have also been recommended as having vermifuge properties, and as being useful in phthisis. In some persons, they always induce an eruption, resembling nettle-rash, with a derangement of the digestive organs.

The leaves are somewhat astringent, and have been recommended in bowel complaints, but are much inferior to the Blackberry-root and other articles of the class. The roots are used in Europe as diuretics, and are frequently given in dysuria in infusion, made with an ounce to the pint of water; they also enter into the composition of many drinks in gonorrhœa, &c. A water distilled from the fruit or from the whole plant, was at one time in some repute as a cosmetic, but is at present seldom or never used.

POTENTILLA.—*Linn.*

Tube of calyx concave, border 4—5-cleft, externally 4—5-bracteolate. Petals 4—5. Stamens numerous. Carpels numerous. Style lateral. Receptacle procumbent, persistent, dry.

Linnæus established two genera, Potentilla and Tormentilla, which differ from each other in so slight a degree that Sibthorpe reunited them into one under the first of these names; in this he is followed by most of the modern authorities. The only character that might justify a separation of them, is the difference of the receptacle; but this scarcely amounts to more than a sectional distinction. The genus is a very extensive one, and consists of herbaceous and suffruticose plants, with pinnate or pinnately-compound leaves. The flowers are generally white or yellow, but in a few species red or purple. They are almost universally natives of the northern hemisphere.

P. TORMENTILLA, *Sibthorp.*—Stem ascending, dichotomous. Leaves ternate, cauline ones sessile. Stipules none or 3-toothed. Carpels rugose. Receptacles villose.

Sibthorp, *Fl. Ox.* 162; *Tormentilla erecta*, Linn., *Sp. Pl.* 716; Woodville, i. t. 9; Stephenson and Churchill, i. 26; *T. officinalis*, *Eng. Bot.* t. 863.

Common Names.—Common Tormentil; Septfoil.

Foreign Names.—Tormentil, *Fr.*; Tormentilla, *It.*; Tormentilwurzel, *Gr.*

Description.—Root large, perennial, woody, irregular, dark brown. Stems several, erect or somewhat procumbent, round, slender, branched towards the top. Leaves mostly sessile, and composed of three oblong, acute, deeply-serrated leaflets, somewhat hairy and paler beneath, dark-green above, furnished with small, deeply-cut stipules. The flowers are small, solitary, of a bright yellow colour, supported on long, slender, axillary, or terminal peduncles. The calyx is hairy, and composed of 4—5 segments, with an equal number of bracts. The petals are 4—5, obcordate, unguiculate. The stamens are numerous, with subulate filaments, shorter than the corolla, with roundish anthers. The styles are lateral and deciduous, on small ovaries. The achenia are ovate, obscurely wrinkled, smooth, and seated on a small, depressed, hairy receptacle.

This plant is a native of many parts of Europe, growing in barren pastures and bushy places. It was early known and employed in medicine as a remedy in bowel diseases, and it is said that its name of *Tormentilla* is derived from *tormentum*, a pain or griping. The part used is the root, which, when dried, is in irregular pieces, more or less cylindrical, knotty, and tuberculated. Externally, it is of a dark reddish-brown colour, internally reddish. Its smell is faint, and its taste astringent. It contains tannin, gummy extractive, gum, bitter extractive, a little resin, cerine and myricin, &c.

Medical Properties.—Tormentil root is an astringent of moderate powers, but is serviceable in many cases, as it produces its astringent effects without

stimulating. Dr. A. T. Thomson speaks well of it in the colliquative diarrhœa of phthisis. It is also beneficial in aphthous sores of mouth and gums, and has been used as an external application to ill-conditioned ulcers. At one period its reputation was very great in the plague and other malignant diseases, and it was recommended by Vesalius as equal to guaiacum in the treatment of syphilis. It is seldom or never employed in this country, where there is such a number of native remedies of similar and even superior powers. The dose in substance is from half a drachm to a drachm. It is employed in some parts of Scotland for the purpose of tanning leather, and in Lapland as a dye.

Geum.—*Linn.*

Calyx sub-campanulate, deeply five-cleft. Petals five, obtuse, or emarginate. Stamens numerous; filaments somewhat persistent. Achenia numerous, dry, aggregated in a conical or cylindrical head, caudate with the persistent styles.

An extensive genus of perennial herbs, with variously pinnately divided leaves, and white, yellow, or purplish flowers. It has been separated into a number of other genera by different botanists, but most of these are not entitled to a higher rank than that of sub-genera or sections. The species which are most numerous in North America, are peculiar to cold and temperate climates, and are all more or less possessed of astringent qualities, and may be substituted one for the other without inconvenience. The *G. urbanum* is officinal in some of the foreign pharmacopœias, and the *G. rivale* in that of the United States; but as this latter is found only to the north, whilst the *G. virginianum* occurs in almost every part of the country, this latter has been selected as a type of the properties of the genus.

G. virginianum, *Linn.*—Pubescent, stem erect; lower leaves ternate, petiolate; upper ones sessile and simple; folioles ovate-lanceolate, acute, unequally serrate; stipules mostly toothed; awns of carpels uncinate, hairy, twisted.

Linn., *Sp. Pl.* 500; Torrey and Gray, *Fl.* i. 421; Rafinesque, *Med. Fl.* i. 220; *G. canadense*, Jacquin, *Hort.* ii. t. 275.

Common Names.—White Avens; Throatroot; Bennet; Chocolate-root.

Description.—Root perennial, small, brown, contorted, horizontal. Stem erect, about two feet high, simple, pubescent, few-flowered. Radical leaves on long petioles, without stipules; lower stem leaves furnished with large stipules, but on shorter petioles; upper leaves sessile, simple, resembling the folioles of the lower leaves, which are oval or ovate-lanceolate, acute at base, and acuminate, deeply and unequally serrate. The flowers are terminal, white, on erect peduncles. Calyx sub-campanulate, deeply five-cleft, with five exterior alternate bracteoles. Petals five, yellowish-white, shorter than the calyx, and inserted into it. Stamens numerous, short, unequal; filaments filiform, anthers roundish and yellow. Styles numerous, long, hairy,

Fig. 141.

G. virginianum.

geniculate above the middle, lower portion glabrous, persistent, uncinate after the upper portion falls off. Fruit a cluster of dry achenia, which are oval, brown, smooth, having a tail or awn formed of the persistent styles, twisted and uncinate at apex.

This plant is found in woods and along streams in most parts of the United States. The flowers are small, and few in number; and the leaves are exceedingly various in their mode of division, and, like the stipules, vary much in size. The whole herb is astringent, but the most efficient portion is the root. This, when dried, is of a brown colour, brittle, crooked, and tuberculated, white internally, of a bitterish, astringent taste, and a somewhat aromatic smell, especially in the spring. No analysis has been made of it; but its composition is probably very similar to that of the *G. urbanum*, which has been shown to contain much tannin and bitter extractive, gum, &c. It yields its active principles to water and alcohol, and communicates a red colour to them.

Medical Properties.—This and the other species alluded to, are tonic and astringent. They are much used in some parts of Europe in a variety of diseases; and are also frequently employed, especially the *G. rivale*, in the New England States and Canada. Both Drs. Ives and Bigelow speak of this with praise in dyspepsia and debility of the visceral functions. They have also been employed with some success in leucorrhœa, chronic hæmorrhages, &c.; but it is evident that they might be rejected from the Materia Medica, as there are many other articles of much greater value, and better capable of fulfilling these indications.

Avens is given in powder, in doses of half a drachm to a drachm, but most frequently in decoction, made with an ounce of the root to a pint of water, of which an ounce or two is to be taken several times a day. Another mode in domestic practice is to take a weak decoction with sugar and milk, instead of tea or coffee.

The *G. rivale* is found both in Europe and the United States, in bogs and wet meadows, and is the species generally employed in the Northern States. The *G. urbanum* is peculiar to Europe, and has yellow flowers.

Section 3. SPIRÆIDÆ.—Calyx tube herbaceous. Fruit, a ring of follicles. Seeds not winged.

SPIRÆA.—*Linn.*

Calyx 5-cleft, persistent. Stamens 10—50, inserted with the petals into a torus adhering to the calyx. Carpels distinct, rarely coherent at base, sessile, rarely stipitate. Seeds exalbuminous.

This extensive genus, which has been variously divided by botanists into numerous sections, and even into other genera, consists of unarmed shrubs, or perennial herbs, with alternate branches, and variously-formed alternate leaves, and white or red, but never yellow, flowers. The species, some of which are highly ornamental, are principally natives of temperate and cold climates, the largest number of them being found in Siberia and North America.

S. TOMENTOSA, *Linn.*—Stem simple, shrubby, erect. Leaves ovate-lanceolate, unequally serrate, tomentose beneath. Spikes terminal, compound. Flowers crowded, pentagynous.

Linn., *Sp. Pl.* 701; Torrey and Gray, *Fl.* i. 415; Rafinesque, *Med. Flor.* ii. 91; Mead, *Med. Repos.*

Common Names.—Hard-hack; White-leaf, &c.

Description.—A small shrub, with many simple, upright, downy stems, from 2 to 4 feet in height, proceeding from the same root. The leaves are alternate, crowded on very short petioles, oblong or ovate-lanceolate, somewhat acute at both ends, and having unequal, acute serratures, of a dark-green or brownish colour above, and covered with a white tomentum beneath. The flowers are in terminal spikes, or panicles, of a beautiful rose-colour, formed of compound racemes of small, sub-sessile flowers. The calyx is campanulate, with 5 acute segments. The petals are also 5, round. The stamens are numerous and exserted. The styles are 5. The carpels are tomentose and spreading. The seeds are subulate at each end.

Fig. 142.

S. tomentosa.

This is one of the most beautiful of the shrubby species, as the 2-coloured leaves and the numerous rose-tinted spikes of flowers give it a striking and ornamental appearance. It is common in low, moist grounds, in most parts of the United States, flowering in July and August. It was known to the Indians as an astringent, and much used by them, but has not attracted the attention it deserves from the medical profession. It is recognised in the U. S. Pharmacopœia; but the officinal portion is there stated to be the root, whereas this is the least valuable part of it, the bark and leaves being the most efficient, and those usually collected for use. As found in the shops, it is in packages of various sizes, containing a mixture of leaves and flowers. The smell is not unlike that of black tea; the taste is bitter, and exceedingly astringent. No analysis has been made of it; but some experiments have shown that its efficient constituents are tannin, gallic acid, and bitter extractive, and of course its sensible properties and medicinal qualities can be extracted by water.

Medical Properties.—Hard-hack is a tonic and astringent of some considerable power, and may be advantageously employed where remedies of this character are indicated, as in diarrhœa, hæmorrhages, &c. It was first brought into notice about 1810, by Dr. Cogswell, of Hartford; and has been since noticed by Drs. Ansell W. Ives, Bigelow, and Tully, as a very valuable addition to the class of astringents, from the fact that it seldom disagrees with the stomach.

The best form of administration is that of extract; this is made by the Shakers for sale; but, like many extracts prepared by them, is often empyreumatic. Made by displacement and evaporation in a water-bath, it affords a beautiful article of an agreeable odour, and astringent, bitter taste, that is fully equal to catechu, and might replace it in all cases where that medicine is required. The dose of this extract is from 5 grains to a scruple. The decoction, made by boiling an ounce of the plant in a pint of water, may be given, cold, in the dose of one or two fluid ounces.

Some other native species of Spirea are also employed in domestic practice, among which the best known is the *S. opulifolia*, or Ninebark, a large

shrub, with white corymbose flowers, very common on the banks of streams in most parts of the country. Rafinesque states that it is possessed of the same properties as the Hard-hack, but some experiments with it have not confirmed this statement; its astringency is much less, and it also possesses an unpleasant odour that militates against its use as an internal remedy. It is, however, useful as an external application in the form of fomentation or cataplasm to ulcers and tumours. The seeds are extremely bitter, and are said to be tonic.

The leaves and roots of *S. ulmaria* and *S. filipendula*, natives of Europe, but generally cultivated in our gardens as ornamental plants, are bitter and astringent, and also possess some diuretic qualities; hence they have been found useful in certain cases of disease of the urinary organs as a substitute for uva ursi. The flowers of the first are aromatic, and a fragrant water forming a pleasant beverage, may be distilled from them. (Lindley, *Flor. Med.* 230.)

Gillenia.—*Moench.*

Calyx sub-campanulate, 5-toothed. Petals 5, linear-lanceolate, somewhat unequal. long. Stamens 10—15, mostly included, 5, sometimes shorter. Styles 5, contiguous, Carpels 5, distinct, or at first connate, 2—4-seeded.

The genus Gillenia was long considered as forming part of Spirea, until Moench proposed to separate the species composing it into a distinct genus; his suggestion was for a long time disregarded, and it has only been within a recent period that botanists have assented to its propriety. It differs from Spirea in having the stamens mostly included, instead of exserted, in the capsule being uniformly of five carpels, each containing two to four seeds. It is exclusively North American, and consists of but two species, which are identical in their medical properties.

G. trifoliata, *Moench.*—Leaves trifoliolate, upper folioles lanceolate, serrate, unequal; lower ones obtuse, with an abrupt, acute termination. Stipules linear, setaceous.

Moench, *Suppl.* 286; Bigelow, *Med. Bot.* iii. t. 41; Barton, *Veg. Mat. Med.* i. t. 5; Griffith, *Jour. Phil. Coll. Pharm.* iv. 177; *Spiræa trifoliata*, Linn., *Sp. Pl.* 702; *Bot. Mag.* 489.

Common Names.—Indian Physic; Bowman's Root; Ipecacuanha, &c.

Description.—Root perennial, composed of a great number of slender brown fibres arising in a radiated manner, from a brown irregular tuber. Some of these fibres are very long, and are knotted or annulated for some distance, as in the true Ipecacuanha. The number of stems varies much, there sometimes being only one, and at others many, arising from the same root. These stems are branched above, and are about two or three feet high, of a reddish or brownish colour. The leaves are all ternate; the upper leaflets lanceolate, serrate, and nearly equal, the lower broader at the end, but terminated abruptly by an acute point. The stipules are linear and entire. The flowers are in terminal, loose panicles, and are composed of five lanceolate, narrow petals, somewhat obtuse and unguiculate at their insertion. They are usually white, but sometimes of a rose red. The calyx is tubular, campanulate, terminating in five sharp segments. The stamens are about twenty, inserted in the calyx, and included, with small anthers. The styles are five, with obtuse stigmas. The capsule is composed of five carpels, connate at base, one-celled, two-seeded.

The Indian Physic is found from Canada to Florida on the east side of the great ridge of mountains, generally in hilly woods, in light gravelly soil. It begins to flower towards the latter end of May, and continues in inflorescence for about a month, ripening its seeds in August. It early attracted the atten-

tion of botanists, who found it well known to the Aborigines as a certain and safe emetic. It is a curious fact, connected with the history of our vegetable Materia Medica, that there is scarcely any native plant possessed of remedial powers, with which the Indians were not well acquainted, before any communication with the whites, whilst there is scarcely one indigenous remedy that has been the result of scientific research. One of the first writers to notice the Gillenia was Shoepf, who, as usual, lauds it in the highest terms, and considers it as an excellent substitute for Ipecacuanha. Linnæus also notices it as possessing properties which were extraordinary in a plant belonging to the order in which he placed it. From a well-founded opinion of its active qualities, it has been recognised in our Pharmacopœia.

Fig. 143.

G. stipulacea.

The root, which is the officinal part, as found in the shops, is of a reddish-brown colour, much wrinkled, and composed of an easily separable cortical portion, and an internal ligneous cord. This cortical part is readily pulverized. It has a very feeble odour, and a nauseous, bitter taste. A chemical examination by Mr. Shreeve (*Am. Jour. Pharm.* i. 28), shows that it contains starch, gum, resin, wax, a fatty matter, a red colouring substance, a volatile colouring matter, and a peculiar principle soluble in alcohol and dilute acids, but insoluble in water or ether.

Medical Properties.—Gillenia is a safe and efficacious emetic in about the same doses as Ipecacuanha. In smaller quantities it acts as a gentle tonic, especially in the torpid condition of the stomach, accompanying some forms of dyspepsia. The only writer that appears to doubt the powers of this article is Dr. Baum (*Phil. Jour. Med. and Phys. Sci.* v. 15), who, from experiments made with it, is of opinion that it is almost inert; but on the other hand we have the concurrent testimony of numbers of the medical profession, that not only is the Gillenia possessed of the qualities generally attributed to it, but also that it is a most valuable addition to the Materia Medica. Some years since I examined this question at

some length (*Jour. Phil. Coll. Pharm.* iv. 177), and endeavoured to point out in what manner Dr. Baum might have been misled in his views, by the deterioration of the roots experimented upon; since which it has been stated to me, that the article he employed was from plants that had been cultivated in a garden for some years. This circumstance would at once account for their inertness, as it is well known, that cultivation increases the starch, but decreases and even destroys the acrid principles of plants, as is evidenced in the potato, parsnip, &c. The testimony in favour of its active powers from Drs. Eberle, Bigelow, Zollickoffer, W. P. C. Barton, and others, is so direct and positive that no doubt can exist of its value, and that it is more analogous to Ipecacuanha in its action, than any other native emetic as yet discovered.

It is given in powder or strong infusion, of which the former is to be preferred; as an emetic, the dose is about thirty grains. When employed as a tonic, the dose is from two to four grains; it may also be administered with good effect as a sudorific, in the form of Dover's powder. The infusion, which is often used in domestic practice, is given in wine-glassful doses, frequently repeated, till the desired effect is induced. This is an objectionable form, as it causes hyper-emesis and catharsis.

The other species, *G. stipulacea*, which is found on the western side of the Alleghany Mountains is distinguished by having the lower leaves pinnatifid, the upper ones trifoliolate, the folioles lanceolate, incised, serrate; the stipules foliaceous, oblique, and jagged. It is rare in calcareous or alluvial regions, but is common in hilly and sandstone districts. It is identical with the *trifoliata* in its sensible properties, but is stated to be more certain in its effects, and not to be deteriorated by cultivation, though the latter assertion has not been fully tested.

Order 46.—DRUPACEÆ.—*De Candolle.*

Calyx 5-toothed, deciduous, lined with a disk. Petals 5, perigynous. Stamens 20, or thereabouts, inserted on the throat of the calyx. Anthers innate, 2-celled, dehiscing longitudinally. Ovary superior, solitary, simple, 1-celled. Ovules 2, suspended. Styles terminal, with a furrow on one side, terminating in a reniform stigma. Fruit a drupe, with the putamen sometimes separating spontaneously from the sarcocarp. Seeds usually solitary, suspended. Embryo straight. Albumen none.

Trees and shrubs, with simple, alternate leaves, glandular towards the base; stipules simple, commonly glandular. Exclusively natives of the northern hemisphere, and almost invariably confined to the cold and temperate regions, very few being found in tropical latitudes.

The general character of the fruits is that of being edible and wholesome, but the kernels and leaves of very many of them contain prussic acid, as in the peach, cherry, &c., but peculiarly evidenced in the cherry laurel. The bark of many of them is tonic and febrifugal, combined with some sedative action.

Amygdalus.—*Linn.*

Calyx 5-cleft. Drupe pubescent, velvety, with a juiceless cortex; which is detached irregularly. Shell pitted or smooth.

This genus, which, as constituted by Linnæus, included both the Almond and the Peach, is now restricted to the former of these. The species are natives of Asia, with the exception of one found in Mexico.

A. COMMUNIS, *Linn.*—Leaves oblong-lanceolate, serrulate. Flowers solitary. Calyx campanulate. Fruit ovoid, compressed, tomentose.

Linn., *Sp. Pl.* 677; Stokes, *Med. Bot.* iii. 101; Woodville, ii. 230; Stephenson and Churchill, i. 43.

Common Name.—Almond tree.

Foreign Names.—Amandier, *Fr.;* Mandarlo, *It.;* Mandelbaum, *Gr.*

There are several varieties, five being admitted by De Candolle, but they are far more numerous; the only kinds that deserve notice as presenting important peculiarities are the *Sweet* and *Bitter*, which differ so much from each other, especially in their sensible properties, as to render it probable that they may be specifically distinct; the differences between them are thus noticed by De Candolle.

a. *Amara.*—Styles nearly as long as the stamens, tomentose below. Seeds bitter; petals white, rosaceous at base. Shell of nut hard or soft.

b. *Dulcis.*—Leaves ash-green. Flowers earlier. Styles much longer than the stamens. Fruit ovate, compressed, acuminate. Seeds sweet. Shell hard.

The Almond is a native of most of the warm parts of Asia, and perhaps of the Barbary Coast. It was very early cultivated in Europe, though there is no evidence of the time at which it was introduced; from the fact that Cato speaks of almonds as *Nuces Græcæ*, it is probable that it came to Italy by way of Greece, but was derived originally from Asia Minor or Persia. They were known in very ancient times, as they are mentioned in Genesis; and Hippocrates employed both the sweet and bitter kinds, and the oil from them. They are cultivated to a large extent in Southern Europe, and would succeed perfectly well in many parts of the United States, as they are by no means as liable to be injured by frost as the orange. They are imported from the South of Europe.

There are several varieties or qualities of both the bitter and sweet almond, depending on the thickness or thinness of the shell, the flavour and form of the kernel, &c. The best of the sweet kind come from Malaga. The kernel of the sweet almond is inodorous, farinaceous, of an agreeable taste, and contains a large proportion of oil. That of the bitter is also inodorous when entire; but when triturated with water, has the odour of prussic acid, and the taste resembles that of the peach kernel; the expressed oil is like that from the sweet kind. Previously to being used, almonds are decorticated, or *blanched*, by putting in hot water, which detaches the seed coat from the cotyledons.

Many analyses of both the sweet and the bitter almond have been made; that of the first, by Boullay, shows it to contain about one-half of fixed oil, about a fourth of emulsin or vegetable albumen, and a small quantity of sugar, gum, woody fibre, &c. Vogel's examination of the bitter kind gave the following results: less than a third of fixed oil, about a fifth of essential oil and hydrocyanic acid, nearly a third of emulsin, and small proportions of gum, sugar, &c.

The fixed oil of almonds is obtained from both varieties, though generally procured from the bitter, from the cheapness of them, and the greater value of the residue; it is inodorous, and has a bland, oleaginous taste; it congeals less readily than olive oil; a hundred-weight of almonds affords from forty-eight to fifty-two pounds of it.

The volatile oil is a very peculiar product, not being procurable by expression, or, in other words, not existing in a formed state in the kernel. It is obtained by distilling the powdered almond, or the marc left after the expres-

sion of the fixed oil, either with water alone, or with salt and water. It is largely prepared for the use of perfumers, confectioners, and cooks, who generally use what is called essence of almonds, or a solution of 3ij. of the oil in 3vj. of alcohol. A hundred-weight of the bitter almond cake, after the expressed oil has been obtained, is distilled with four hundred gallons of water; the product varies much in quantity, being from one ounce to three. This oil, as before stated, does not pre-exist in the almond; but is shown by Robiquet, Liebig, and others, to be formed by the action of water on some of the constituents; these are the emulsin and amygdalin, the latter of which is a crystalline substance, found in the bitter, but not in the sweet almond. This volatile oil is of a golden-yellow colour, an agreeable smell, and an acrid, bitter taste. It is a most active poison, acting as rapidly, and giving rise to the same symptoms as hydrocyanic acid. The bitter almond itself is poisonous, although the poisonous principle is not developed until after it has been for some time in the stomach, and has been acted upon by the fluids of that viscus.

Medical Properties.—Almonds are demulcent and nutritive, but are difficult of digestion where the stomach is weak, on account of the quantity of oil they contain, and when not deprived of their epidermis, are still more liable to disagree; in some persons they induce urticaria, whilst in others a few blanched almonds will relieve heartburn. They are used in medicine for making emulsions, confections, syrups, &c., which have been found useful in irritating coughs, affections of the bladder, &c. Many of the nostrums for eruptions, as Gowland's Lotion, Milk of Roses, &c., consist of corrosive sublimate dissolved in emulsion of almonds, sometimes with the addition of sugar of lead or oxide of bismuth, but generally with the mercurial salt alone.

The oil of almonds possesses the same properties as the other bland oils; and, like them, in large doses, acts as a laxative; it is also used in the form of an emulsion, made by the addition of mucilage or yolk of egg in the same cases as that from the almond itself. The volatile oil is seldom used in medicine in this country, its principal employment being by perfumers and confectioners. The bitter almond has been extolled by some writers as a remedy in intermittent fever; and Dr. Mylius, of Russia, states that he has been eminently successful with it.

A. persica, or Peach, usually considered as derived from Asia, appears to have been cultivated by the Indian tribes in the southern parts of this country at the time of the discovery, as it was found common among them by the earliest travellers; there is, however, no satisfactory evidence to show that it is a native of America. The fruit is too well known to require notice. The leaves, flowers, and kernels, abound in hydrocyanic acid. The leaves have been used as a vermifuge and purgative, but should be employed with much caution; the same remark applies to the flowers, which at one time were in much vogue for the same purpose, and are still employed in some parts of Europe as the basis of an anthelmintic syrup. Dr. Christison (*Treat. on Poisons*, 58,) quotes two cases from Coullon, in which the flowers proved fatal, producing all the symptoms of acro-narcotic poisoning. The kernels are much used as a substitute for bitter almonds, in culinary preparations, and in the manufacture of Noyau; their shell is said to be febrifuge, and, according to M. Burtin (*Mat. Med. Ind.* 73) are fully as efficacious as cinchona.

Prunus.—*Linn.*

Calyx urceolate, 5-parted, deciduous. Petals spreading. Stamens 15—20. Ovary glabrous, with 2 pendulous ovules. Drupe ovate or oblong, fleshy, glabrous, usually co-

vered with a bloom. Stone more or less compressed, acute, smooth, the margins somewhat grooved.

This genus consists of trees and shrubs peculiar to cold and temperate climates, having simple leaves, usually glandular at base. The fruit is eatable, the bark yields gum, and the leaves, bark, and kernel of the fruit contain hydrocyanic acid. As formerly instituted by Linnæus, *Prunus* comprised many species which have since been very properly erected into separate genera.

P. DOMESTICA, *Linn.*—Flowers almost solitary. Leaves lanceolate-ovate, convolute. Branches not spinous.

Linn., *Sp. Pl.* 680; Woodville, iii. 187; *Flore, Med.* v. 280.

Common Names.—Plum Tree; Green Gage, &c.

Foreign Names.—Prunier, *Fr.*; Susina, *It.*

Description.—The cultivated plum tree presents such an immense number of varieties, that it is impossible to give a description that is applicable to all, except that it is a small tree with white flowers. De Candolle, in his Prodromus, admits 9 varieties; but Don, in his System of Gardening, enumerates 270, which is far from including all that are known. Although now found in many parts of Europe, it is supposed to have been originally brought from Asia Minor: it was not known to the Romans until the time of Pliny; and it is thought by Tenore that the Plum noticed by Theophrastus and Dioscorides was not this species, but the *P. cocumiglia*, a native of some parts of Italy.

The only parts used in medicine are the dried fruits, well known under the name of *Prunes*. These are principally prepared in the south of France, and are imported from Bordeaux and Marseilles. They are usually employed as a dessert; but are also used as a laxative, either raw or stewed, and alone, or combined with a decoction of senna, and are added to some officinal preparations to improve their flavour or to add to their effects.

Several other species have been used in medicine. The bark of *P. spinosa* is stated to be eminently febrifuge, and, according to some authors, is fully equal in this respect to Cinchona. It is given in powder, in doses of half a drachm to two drachms (Willemet, *Mat. Med. Indig.* 70). It closely resembles in its effects the *P. cocumiglia*, spoken of above, and which, according to Tenore (*Mem. sul Pruno cocumiglio*), is much employed in Calabria in intermittent fevers.

CERASUS.—*Jussieu.*

Drupe globose, fleshy, destitute of bloom. Stone mostly globose, smooth.

This genus was originally instituted by Tournefort, but was included in *Prunus* by Linnæus, again separated by Jussieu, and now recognised as distinct by almost all botanists. It consists of trees and shrubs, which may be divided into several natural groups or sections, founded on the mode of flowering and the persistence or non-persistence of the leaves. One of these (*Eucerasus*, Torrey and Gray) contains those species in which the flowers spring from lateral, leafless buds, appearing before or with the leaves, the pedicels being umbellate-fascicled or corymbose. This group contains the cultivated varieties, so well known as *Cherries*, which are supposed to be derived from several distinct wild species. As, however, they are of little importance in a medicinal point of view, they require no further notice.

Section 2. *Padus.*—Flowers in racemes, terminating leafy branches, appearing after the evolution of the leaves. Leaves deciduous.

1. C. SEROTINA, *De Candolle.*—Leaves somewhat coriaceous, oval, oblong, or lanceolate-oblong, acuminate, glabrous, or bearded along the midrib beneath, smooth and shining above, finely serrate, with appressed or incurved, callous teeth. Petioles (or base of the leaf) mostly with two or more glands. Racemes elongated, spreading. Petals broadly obovate. Drupes globose, purplish-black. (Torrey and Gray.)

Seringe, in *De C.*, ii. 540; Loisel, in *Duhamel*, p. 2; Torrey and Gray, *Fl.* i. 410.

Common Names.—Wild Cherry; Black Cherry; Choke Cherry.

Description.—A large tree, attaining a great height and size in the Southwestern States, but usually about twenty-five to thirty feet. The trunk is covered with a rough, blackish bark, which spontaneously detaches itself in thick, narrow plates. The wood is hard, heavy, and close-grained, and is much used in cabinet-work. The leaves are ovate-oblong, acuminate, unequally serrate, smooth on both sides, except the midrib, and supported on petioles furnished with two or more glands. The flowers are in elongate, spreading, and sometimes pendulous racemes, of a white colour, and of a smell of bitter almonds. The fruit is globose, of a purplish-black colour, eatable, but having a bitter taste. The flowers appear in May, and the fruit ripens in August and September. It is found in most parts of the United States.

There has been much confusion regarding this and the *C. virginiana*, in consequence of a transposition of names, originating with Michaux. This was rectified in De Candolle's Prodromus, and more fully elucidated by Drs. Torrey and Gray (*Flor. N. Am.*) as follows: "This (*C. virginiana*) and the succeeding species (*C. serotina*) are perfectly distinct, and are well characterized by Errhart, who first distinguished them. The confusion respecting them has resulted from an error of the older authors, and the subsequent transposition of the specific names. The *Prunus virginiana* of Linnæus was founded on the present species (the Choke Cherry), as appears from his description and herbarium; but the synonyme adduced from Gronovius relates to the succeeding species, that of Plukenet (omitted in edition ii.) to *Itea virginica*, and that of Catesby to *Cerasus caroliniana*. Michaux, having taken the following for the Linnæan species, the present plant came to be called *P. serotina*, by American botanists applying to it, to increase the confusion, the character of Willdenow's *P. serotina*."

This transposition of names has been followed by all American botanists, and by most writers on American plants, though the name might have indicated the error, for the *C. serotina* ripens its fruit near a month later than the *C. virginica*. The Pharmacopœia still adheres to the old nomenclature, and calls it the *P. virginiana*, not recognising the genus *Cerasus*. As regards the specific name, it is of little importance, as it is more than probable that both species are identical in their effects, and that both are indiscriminately used. It is also likely that the American species belonging to the section *Eucerasus* are also endowed with similar qualities, and are so spoken of by Rafinesque; but no proper trials have been made to ascertain their real value.

The part used for medical purposes is the bark of the roots or branches, the former of which is always to be preferred. As found in the shops, it is deprived of its epidermis, in pieces of various lengths and sizes, of a reddish-brown colour, bitter, and readily pulverized. When fresh it has an odour of bitter almonds; this is almost lost on drying, but becomes apparent on maceration. The taste is bitter, aromatic, resembling that of peach-kernels. Many chemical examinations have been attempted of this bark, but the first that afforded a clear view of its real constitution, was by Mr. S. Procter (*Jour. Phil. Coll. Pharm.*, vi. 8). He found in it resin, starch, gallic acid, tannin, fatty matter, red colouring matter, some salts, &c. On distilling it

with water, a volatile oil, combined with hydrocyanic acid, was obtained. This product was subsequently examined by Mr. Wm. Procter (*Amer. Jour. Pharm.*, iii. 300, iv. 197), and shown to be nearly identical with the oil of bitter almonds, and, like that substance, not to pre-exist in the bark, but to be formed by the action of emulsine on amygdaline, as in the almond. These observations show the close chemical alliance existing between the genera *Amygdalus* and *Cerasus*, and which the same experimenter has proved to extend to the inosculating genus *Armeniaca;* thus confirming the validity of their botanical arrangement.

Medical Properties.—The bark is tonic and exciting in its operation on the digestive organs, and at the same time exercises a sedative influence on the circulatory and nervous systems, owing to the presence of the hydrocyanic acid. From this combined action, Wild Cherry Bark has been found extremely useful in a variety of diseases or states of disease, where it is of importance to impart tonicity, and yet to avoid any undue excitement of the circulation; as during the first stages of convalescence from inflammatory attacks, in many of the pulmonary diseases. In phthisis, where hectic fever exists, it has also proved highly beneficial, and its use is becoming very general in this complaint. It has been advantageously employed in some forms of dyspepsia, especially in the form of a cold infusion. It has likewise been used as a febrifuge in intermittents, and, like all other tonic remedies, has proved serviceable, but should not be relied upon, except in cases where the Peruvian bark or its salts are inadmissible. This article has not yet been sufficiently investigated, as regards its true curative powers, but enough is known to entitle it to a very high rank among the articles of the Materia Medica, either of foreign and native origin.

It is given in powder, in doses of half a drachm to two drachms, or in infusion, which is officinal in the U. S. Pharmacopœia; it is made with half an ounce of the bark to a pint of water; the dose a couple of ounces or more, as may be required. This preparation is a pleasant and effectual mode of exhibiting it; as the hydrocyanic acid is volatilized by the heat required to make a decoction, this latter form is highly objectionable. Another preparation of it has, within a short time, attained much celebrity, and is highly spoken of by those who have used it; this is the Syrup (see *Amer. Jour. Pharm.* vii.); this is a neat and effective form of exhibition, and is coming into very general use.

Section 3. LAURO-CERASUS.—Flowers in racemes from the axils of the persistent leaves of the former season.

2. C. LAURO-CERASUS, *Loisel.*—Racemes shorter than the leaves. Leaves ovate-lanceolate, remotely serrate, with 2—4 glands beneath. Fruit ovate, acute.

Linn., *Sp. Pl.* 678; Woodville, iii. 513; Stephenson and Churchill, ii. 117; Lindley, *Flor. Med,* 232.

Common Names.—Cherry Laurel; Common Laurel.

Foreign Names.—Laurier cerise, *Fr.;* Lauro regio, *It.;* Lorbeerkirsche, *Ger.*

Description.—The Cherry laurel is a small tree, with spreading branches covered with a smooth brown bark. The leaves are evergreen, persistent, alternate, on short petioles; they are elliptical, tapering towards the base, pointed and curved at the apex, finely serrate, smooth, deep-green, and furnished with two or more glands at base. The flowers are in short, axillary, erect racemes. The calyx is inferior and five-toothed. The corolla consists of five small, concave, spreading petals, of a whitish colour. The stamens are alternately longer and shorter, about fifteen to eighteen in number,

Fig. 144.

C. lauro-cerasus.

with subulate filaments and roundish anthers. The ovary is round, and supports a columnar style, with a globose stigma. The fruit is a globular drupe, of a shining black colour, closely resembling a small cherry, in appearance and structure.

This plant flowers in May, and is cultivated as an ornamental evergreen in many parts of Europe, but is too tender to withstand the frosts of the northern and middle sections of this country, but would probably grow perfectly well to the south, where many allied species are native. It is indigenous to the Levant, and was introduced into Italy towards the close of the sixteenth century. It has been mistaken by some writers for the true Laurel (*Laurus nobilis*), and supposed to have been the plant dedicated to Apollo, and used to crown victors; but it does not appear to have been known to the Greeks or Romans; the mistake has arisen probably from the plant in question having received the name of Laurel, whilst the true laurel became known under the name of the Bay tree.

The part of the Cherry laurel which is officinal is the leaves; these are almost inodorous, until they are bruised, when they emit a bitter almond odour. Their taste is bitter, aromatic, and somewhat astringent. When they are dried, they lose all smell, but retain their flavour. The properties of these leaves depends in a great measure on the hydrocyanic acid they contain. On distillation with water, they afford a volatile oil, which, as in the case of the *C. serotina*, is probably a product of the operation, from the transformation of amygdalin by the action of emulsin; it should be stated that Wohler and Liebig were unable to detect this substance in their examination of the leaves. The volatile oil closely resembles that of the bitter almond in its properties, but is not as powerful in its action on the stomach. Besides the oil, distillation affords a medicated water, Cherry laurel water, which is also poisonous, from containing a certain proportion of hydrocyanic acid. This water is officinal in some of the foreign Pharmacopœias, and was formerly much used in the cases in which the diluted hydrocyanic acid is employed, but is now seldom prescribed as a medicine, though is in request as a flavouring ingredient in certain culinary preparations, more especially in Europe, being superseded in this country by an equally poisonous preparation, "Peach-leaf water."

Medical Properties.—As both the volatile oil and the distilled water owe their powers to the hydrocyanic acid they contain, they are of course applicable to the same deranged conditions of the system in which this article has been found useful, and as just said, have been almost superseded by it. The distilled water is chiefly interesting at present, in a medico-legal point of view, as many cases of poisoning with it have occurred, and been the subject of judicial investigation; one of the most celebrated of which was that of Captain Donelly for the murder of Sir Theodosius Boughton. This case, has

by many writers been considered as one in which the evidence of poisoning was by no means clear, and where, in the words of Mr. Phillips (*Theory of Presumptive Proofs*), a man was unwarrantably condemned on circumstantial evidence, has been most ably commented upon by Dr. Beck, and the presumption shown to be, in accordance with the verdict of the jury, that the accused was guilty. Many accidents have occurred from this article, where it has been too freely used in cookery, and the preparation of cordials; and it cannot be too strongly impressed on the public that there is always danger in partaking of food, in which this or any other flavouring ingredient containing hydrocyanic acid has been used. Thus, death has occurred from a single glass of *Noyau*, a cordial which is made with peach or cherry kernels.

There are several species of Cerasus belonging to this section of the genus, which are natives of the Southern States, and all of them are doubtless fully as poisonous as the Cherry laurel. Thus Elliot (*Sketch Bot. So. Car.*) states that the leaves of the *C. caroliniana* are very deleterious, frequently destroying cattle that are tempted to feed on them. Many of the foreign species are also very active, particularly the *C. capricida* of Northern India, the leaves of which are highly injurious and even fatal to goats. The bark of *C. capollim*, a native of the cooler parts of Mexico, furnishes a febrifuge bark which is much esteemed in the treatment of intermittent fevers. The *C. padus* of Europe also affords a tonic bark, which at one time was much employed for the same purpose.

Order 47.—POMACEÆ.—*Lindley.*

Calyx adherent, 5-toothed. Petals 5, unguiculate, inserted in the throat of the calyx; the odd one anterior. Stamens indefinite, inserted in a ring in the throat of the calyx. Disk thin, ovaries 1—5, adhering more or less to the sides of the calyx and to each other; ovules usually 2, collateral, ascending, rarely solitary, sometimes none; styles 1—5; stigmas simple. Fruit, a pome, 1—5-celled, seldom spuriously ten-celled; the endocarp either cartilaginous, spongy, or bony. Seeds ascending, solitary. Albumen none. Embryo erect.

Trees or shrubs with alternate, simple or compound, stipulate leaves, natives of the northern hemisphere, and almost exclusively of the temperate parts. The fruits are edible, and the bark, especially of the roots, is bitter and febrifuge, containing in the Apple a peculiar principle, to which the name of *Phloridzine* has been given. That of *Pyrus aucuparia* contains as much prussic acid as is afforded by the leaves of the cherry laurel. Some of the barks contain a colouring matter, that of *Photinia dubia*, being used in Nepal for dyeing scarlet.

Cydonia.—*Persoon.*

Calyx 5-cleft. Petals somewhat orbicular. Stamens erect. Styles 5. Pome closed, 5-celled; cells many-seeded, cartilaginous. Seeds enveloped in a mucilaginous pulp.

This small genus was first indicated by Tournefort, but all the species were included by Linnæus in that of *Pyrus*, in which they remained till again erected into a distinct genus by Persoon, in which he has been sanctioned by succeeding botanists. They are all small trees with undivided leaves. The flowers are large, solitary or few. They are natives of temperate or cool climates.

C. vulgaris, *Persoon.*—Leaves ovate, roundish, entire, obtuse at base, downy beneath. Flowers solitary. Calyx serrated, reflexed, tomentose.

Persoon, *Ench.* ii. 40; Lindley, *Flor. Med.*, 234; *Pyrus cydonia*, Linn., *Sp. Pl.* 687; Woodville, iii. 505; Stephenson and Churchill, ii. 115.

Common Names.—Quince Tree; Common Quince.

Foreign Names.—Coignassier, *Fr.;* Melacotogna, *It.;* Quittenkorner, *Ger.*

The Quince tree is a native of the countries along the Danube, Greece, &c. It derives its generic name from Cydon in the island of Crete. It was known to the ancients, and was used by Hippocrates as an astringent in dysentery; this was, probably, the fruit of the wild plant, which is very austere; the Romans cultivated it, and termed it *malum cotoneum*, from its downy covering. It was one of the first of the foreign fruits introduced into England. There are several varieties, but they are far from being as numerous as might have been expected, where a plant has been so long cultivated. This may have arisen from the fact, that it is seldom propagated by seed, but by layers, suckers or cuttings. The finest is said to be the Portugal or oblong quince. The tree flourishes best in a moist soil, but the fruit is not as fine as when it grows in a dry situation.

In a raw state, the fruit is not eatable; but when cooked or preserved, it is highly grateful. The expressed juice, in small quantities, is somewhat astringent, and has been recommended to allay nausea and vomiting. The only officinal part at present is the seeds; these are inodorous, nearly insipid, and abound with a mucilage which they yield to water. One drachm affords nearly six ounces of a nearly colourless mucilaginous infusion, about as consistent as the white of an egg. This mucilage is peculiar, and has received the name of *cydonin;* its properties approach nearer to bassorin than to any other of the gums, but differs from it by solubility in water.

Medical Properties.—The mucilage is a demulcent, and has been used in gonorrhœa, in dysentery, in aphthous affections and excoriations of the mouth and fauces, in which latter cases it is usually combined with borax and honey. It has also been used with some success as a collyrium in inflammations of the eyes. It is very pleasant and seldom offends the stomach, but is not equal to that from the pith of sassafras; it is also very apt to spoil and become mouldy in a short time, and, therefore, should be prepared only as it is wanted. It is also used by ladies' hair-dressers to give a consistence and smoothness to braids.

Pyrus.—*Linn.*

Calyx tube urceolate, superior; limb 5-lobed. Petals 5, rounded, larger than the calyx, with short claws. Stamens 20, arising from the rim of the calyx, shorter than the corolla. Anthers 2-lobed, oblong. Ovary inferior; styles 2—3 to 5, filiform, about the length of the stamens; stigmas simple, bluntish. Pome rounded, or somewhat oblong, umbilicated, fleshy, with as many cartilaginous or membranous cells as there are styles. Seeds 2 in each cell, testa chartaceous or cartilaginous.

This important genus is composed of middle-sized trees, with simple or pinnate, alternate leaves. The flowers are mostly corymbose and terminal, rarely solitary, and of a white or rose colour. The fruit is generally eatable. The species are natives of the temperate regions of the northern hemisphere. Botanists are by no means in unison as regards the limits of the genus; some with Lindley (*Linn. Trans.* xiii. 97) considering it composed of *Pyrus* and *Sorbus*, Linn., whilst others are of opinion that it should be divided into several distinct genera. As Lindley's view of the subject has been adopted by Torrey and Gray (*Fl. N. Am.* i. 470), it will now be followed, though it is highly probable, that what they regard as sections are entitled to rank as genera.

Sec. 1. *Malus.*—Leaves simple, not glandular; cymes simple; petals spreading, flat; styles 3—5, united at base; pome usually globose or depressed, umbilicate at base; cells cartilaginous.

The endless varieties of the Apple are all said to be derived from the *P. malus* or wild crab, a native of the temperate parts of Europe. The apple was very early cultivated, and is noticed by the first writers whose works have come down to us. Its uses as a fruit and as furnishing cider are too well known to require notice. As an article of the Materia Medica, this is mainly employed when roasted, to obviate costiveness, or in the formation of cooling drinks; the cooked pulp has also been recommended as a cataplasm in cases of inflammation of the eyelids. The acid juice of the crab apple, known under the name of Verjuice, has been found useful as a topical application to sprains and bruises. The most important remedial agent obtained from this genus is *Phloridzine*, a bitter principle which exists in all the Pomaceæ, but appears to be most abundant in the apple tribe. This was discovered by M. de Koninck about ten years since. It is neutral, of a white colour, and very bitter taste, and has been found very beneficial in intermittent fevers, and is said to have succeeded where quinia had no effect. It is given in the same manner as this alkaloid. (See Dunglison, *New Rem.* 490.)

Sec. 2. *Sorbus.*—Leaves pinnate or pinnately lobed; cymes compound; petals spreading; styles 2—5, distinct; pome globose or turbinate; cells not cartilaginous.

Several species of this section have been ranked as medicinal agents; but the only one that appears deserving of notice is *P. aucuparia* or Mountain Ash of Europe. The bark, flowers and root of this tree contain so much of the peculiar essential bitter of almonds as to yield as much hydrocyanic acid as the cherry laurel. (*Buch. Reper.*, 27, 238.)

The North American *P. americana*, so closely allied to the above as to be scarcely distinguishable from it, probably partakes of the same chemical characters, and if so, might be advantageously employed in those cases in which the Wild cherry has been found so beneficial; but no experiments have been made to ascertain its true character. Rafinesque says of it, "Bark smells and tastes like cherry bark, equal to it, more astringent, fine tonic, antiseptic, contains prussic acid, used in fevers and other diseases like cinchona."

Group XIX.—Myrtales.

Order 48.—MYRTACEÆ.—*Brown.*

Calyx adherent, valvate, 4—5-cleft. Petals equal in number to the segments of the calyx, with a quincuncial æstivation; rarely none. Stamens indefinite, or twice as many as the petals, rarely equal to them in number; filaments either distinct or connected in several parcels; anthers ovate, 2-celled, small, with a longitudinal dehiscence. Ovary inferior, 1—2, 4—5, or 6-celled; style simple, springing directly from the placenta; ovules usually pendulous, or erect and anatropal; occasionally peltate and amphitropal, always inserted into a central or axile placenta. Fruit dry or fleshy, dehiscent or indehiscent. Seeds usually indefinite, variable in form; embryo straight or curved, with no albumen.

Trees or shrubs with opposite or alternate, entire leaves, generally with transparent dots, and a vein running parallel to their margin. Flowers red, white, or yellow, never blue. They are natives of warm climates, principally in South America and the East Indies, but a considerable number are found in New Holland, and the South Sea Islands. Their general characteristics are those of aromatics and astringents. The pellucid dotting of the leaves indicates the presence of a volatile oil, and to this is due the most striking quality of the order; this aroma is found in the fruit of the Guava, *Psidium*, and the Rose apples, *Eugenia*, the berries of the Myrtle, &c.; in many it is in union with an astringent principle.

In some this aromatic and stimulant oil predominates, as in Cloves, which

are the dried flower-buds of *Caryophyllus aromaticus;* in Pimento, or the fruit of one or more species of *Eugenia;* in *Melaleuca cajeputi*, from the leaves of which the Cajeput oil is obtained.

In others again, the astringent principle is predominant, as in *Punica*, the bark of the fruit of which contains much tannin; in the bark of many species of *Eucalyptus*, which are used for tanning. On the other hand, some species afford a sweet gum, especially the *Eucalyptus mannifera*. The leaves of others are substitutes for tea, as various species of *Leptospermum*, *&c.*

Punica.—*Linn.*

Tube of the calyx turbinate, limb 5—7-cleft, coriaceous. Petals 5—7. Stamens indefinite; filaments free; anthers anteriorly 2-celled, dehiscing by a double chink. Style filiform; stigma capitate. Fruit spherical, crowned with the limb of the calyx, coated with the tube, indehiscent, unequally divided into two parts by a horizontal diaphragm, the upper 5—9-celled, the lower three celled, dissepiments membranous. Placentæ of upper chamber fleshy, spreading from the sides to the centre; those of lower chamber, in irregular processes from its base. Seeds very numerous, mixed with a pellucid pulp, exalbuminous; embryo oblong; radicle short, straight cotyledons foliaceous, spirally convoluted.

A small genus erected into an order by Don (*Ed. Phil. Jour.* 1826), in which he has been followed by De Candolle and other high authorities. Lindley, however, is of opinion that it may be allowed to remain in the Myrtaceæ, on the ground that the only real differences it presents are its leaves without a marginal vein, its convolute cotyledons and pulpy seeds.

P. granatum, *Linn.*—Leaves lanceolate. Stem arborescent.

Linn., *Sp. Pl.* 676; Woodville, t. 58; Stokes, *Med. Bot.* iii. 84; Stephenson and Churchill, i. 57; Lindley, *Flor. Med.* 74.

Common Name.—Pomegranate tree.

Foreign Names.—Grenadier, *Fr.;* Pomogranato, *It.;* Granatbaum, *Ger.*

Fig. 145.

P. granatum.
1. Calyx and stamens. 2. Stamen. 3. Fruit.

Description.—A small tree covered with a brownish bark, with many slender branches, which are more or less spiny. The leaves are opposite or ternate, sessile, waved, entire, lanceolate, of a bright-green colour. The flowers are large, of a rich scarlet colour, solitary, or two or three together, terminal. The calyx is turbinate, thick, fleshy, of a red colour, and divided into five acute segments which are valvate in æstivation. The corolla is formed of five large, wrinkled petals, somewhat spreading. The stamens are indefinite, with capillary filaments, and oblong, two-celled anthers, bursting in front by two chinks. The ovary is inferior, with a simple style, crowned by a papulose stigma. The fruit is the size of an orange, globular, somewhat compressed, and indehiscent; it is filled with numerous, angular, exalbuminous seeds, each enveloped in a juicy rose-coloured pulp, and is crowned with the limb of the calyx, and covered with a thick, tawny, coriaceous rind, which is the dilated calycine tube. This *balaust*, as it is termed, is divided into two chambers by a transverse diaphragm. The upper chamber is five to nine-celled, and the lower three-celled. The placentæ of the

upper division extend from the parietes to the centre, whilst those of the lower proceed irregularly from the bottom.

The Pomegranate is a native of Northern Africa, Syria, and Persia, and is now naturalized in the warmer portions of Europe, the West Indies, &c. It was very early known, being constantly referred to in the Bible, and is noticed by Homer. The Romans became acquainted with it during their contests with the Carthaginians, and hence called it *Malum Punicum*. The flowers, which were termed *Balaustra* by the ancients, are nearly inodorous, but somewhat of a styptic taste. The juice, which is contained in the membranous cells, exhales a vinous smell when fresh, is of an agreeable subacid taste; it is very refreshing; it contains much mucilage united to a little tannin; it is much used in the East for making sherbets, and is highly esteemed.

The flowers, rind of the fruit, and the bark of the root, are all officinal, but the two latter only are recognised in the U. S. Pharmacopœia. The flowers are mild astringents, but never used in this country. The rind of the fruit, when dry, is in irregular, convex, brittle, brownish fragments, with no smell, but a bitter astringent taste. The bark of the root is in small pieces, of an ash gray or yellowish colour externally, yellow within, brittle, not fibrous, of an astringent but not bitter taste. These substances have been several times analyzed; Reuss (*Hanb. d. Chim.*) found in the rind of the fruit, tannin, extractive, gum and a little resin; and Latour de Trie in the bark of the root, tannin, gallic acid, resin, mannite, &c. This analysis, however, is not satisfactory, as it does not show the existence of any principle in the bark, which will produce the symptoms which ensue on an administration of a large dose of it.

Medical Properties.—The pulp of the fruit is refreshing to persons suffering from fever, and is said to be somewhat diuretic. It is much used by Hindoo practitioners to allay unnatural heat of the system. The rind of the fruit is a powerful astringent, and as it gives out its properties to water has been recommended by Dr. Cullen, and others in relaxation of the uvula and in aphthous disorders of the mouth, and also in chronic diarrhœa, prolapsus uteri, &c. It has also been beneficially employed in the perspirations attendant on phthisis, and in the colliquative diarrhœa so frequent in the last stages of that complaint. This substance is but little used, as it is far less agreeable and not more efficient than many others of its class, and has been found in many cases to cause nausea and uneasiness of the stomach.

The bark of the root has long been used in India as a specific in cases of tape-worm, and in consequence of the recommendations of Drs. Fleming, Buchanan, and Ainslie, it was extensively experimented with in Europe, and with almost universal success. In this country, from the comparative rarity of the disease, it has been but little used, added to which it has been found that the oil of turpentine, in large doses, is perfectly effectual. Another cause will always prevent its general employment in cold climates, which is, that the bark must be used in a recently dried state. The mode of administration is in decoction made with two ounces of the freshly dried bark to two pints of water, boiled down to a pint, of which a wineglassful is to be taken every half hour till the whole is consumed. It generally creates nausea, and sometimes vomiting, purging, and even vertigo and syncope. M. Bourgeoise (*Bib. Med.* 1824), who gave it in a great number of cases, advises that before commencing with its administration, the patient be kept on a strict and spare diet for some days, and the evening before the medicine is taken, to have his bowels well opened by means of a full dose of castor oil.

Melaleuca.—*Linn.*

Calyx 5-parted. Petals 5. Stamens numerous, very long, in five bundles. Styles filiform. Capsule 3-celled, many-seeded.

An East Indian genus containing a few species of trees which abound in an aromatic volatile oil; they principally grow in Amboyna, Java, and Borneo, and are used for various purposes. Crawford (*Hist. Ind. Archipel.*) says that the bark of one furnishes the material with which the native vessels are caulked, and the wood is employed for a variety of purposes.

M. CAJUPUTI, *Maton.*—Leaves alternate, elliptical, lanceolate, somewhat acute, slightly falcate, 3—5-nerved. Flowers spiked, rather distant. Rachis, calyx and young branches tomentose.

Maton, *Lond. Pharm.* 1800; Roxburgh, *Fl. Ind.* iii. 394; Stephenson and Churchill, ii. 84; Lindley, *Fl. Med.* 73; Colebrooke, *Trans. Med. Bot. Soc.* i. 27; *Jour. Phil. Coll. Pharm.* i. 193; *M. minor*, Smith, *Rees' Cyclop.;* De Candolle, *Prod.* iii. 212; *M. leucadendron*, Lamarck, *Illus.* t. 441, fig. 4.

Common Names.—Cajeput-tree; Lesser Cajeput.

Foreign Names.—Cajeput, *Fr.;* Melaleuca orientale, *It.;* Kaya-puti, *Malay.*

Description.—Trunk erect, but crooked, covered with a very light or ash-coloured, soft, thick, smooth, spongy bark, the outer lamina of which peels off from time to time, like the Buttonwood or Birch. The branches bear scattered, slender twigs often drooping, they are round and smooth, the young shoots sericeous. The leaves are alternate, on short petioles not unlike those of the willow, lanceolate, and whilst young, sericeous; when full grown, smooth, deep-green, three to five-nerved, and sometimes a little falcate. When bruised, they have an aromatic odour; but the cells containing the oil are barely visible. The spikes are terminal, and from the extreme axils, downy. The flowers are small, white, sessile, and inodorous, accompanied by solitary, lanceolate, sericeous bracts. The calyx is urceolate, sericeous, and divided at the margin into five deciduous segments. The petals are five, rounded with short claws and longer than the calyx. The stamens are numerous, united in five bundles at base, much longer than the petals and with them inserted on the calyx; anthers ovate-cordate, with a yellow gland at their apex. The ovary is ovate, crowned with a slender style longer than the stamens, and having an obscurely three-lobed stigma. The capsule is three-valved, covered by the thick permanent tube of the calyx, many-seeded.

Fig. 146.

M. cajuputi.
1. 2. Ovary. 3. Calyx and stamens.

This tree is a native of the Moluccas, and was first described by Rumphius (*Amboina*, ii. 76) as *Arbor alba minor*, afterwards by Sir J. E. Smith (*Rees' Cycloped.*) as *M. minor*, and some years subsequently by Dr. Roxburgh (*Cat.* 59) as *M. cajuputi*. It is the species furnishing most of the cajeput oil of commerce, which at one time was supposed to be exclusively derived from the *M. leucadendron*, but specimens of the tree, affording this product, having been obtained in the Moluccas by Mr. C. Smith and sent to England, they were found to belong to the *M. minor*, and young trees transmitted by the same collector to the Botanic Garden at Calcutta, all proved to

be of that species, and not of the *M. leucadendron*. Rumphius states explicitly that the oil is obtained from the small species, and makes no mention of any from the larger one; and Dr. Roxburgh, whilst admitting that the two resemble each other very much, says the leaves of the larger kind possess little or no fragrance when bruised. On these grounds it is now assumed that the Cajeput oil of commerce is exclusively derived from the *M. minor*. I may mention, however, that having had an opportunity of examining a quantity of Cajeput oil direct from the Moluccas, and in the original packages, I found the bottles packed in leaves of both species, and that these leaves had evidently been subjected to distillation; and when it is considered that the two species are so closely allied to each other as to render it difficult to discriminate between them, that they grow in the same regions and are exposed to the same circumstances of soil and climate, it would be an anomaly that one of them should furnish an oil, and the other be destitute of it.

The oil, which is the officinal portion, is obtained from leaves gathered during warm, dry weather, and placed in a sack, where they become heated in a short time; they are macerated in water and fermentation permitted for one night, and afterwards distilled. The product is very small; and is of a grass-green colour. When pure, it is of different shades of green, which at one time was thought to be owing to the presence of copper, but careful investigation has shown that this tint is dependent on chlorophylline or some analogous resinous principle. Sometimes the oil is nearly white, clear, and very limpid. It has a strong aroma resembling a mixture of camphor, rosemary and cardamoms; the taste is pungent, with an after-sensation of coolness like that produced by the oil of peppermint. No oil is more often adulterated, and when of a dark colour and not wholly soluble in alcohol, should always be rejected.

Leveköhn says that this oil is a compound fluid, consisting of two distinct oils, one of a green colour, heavier than the ordinary fixed oils, the other, which constitutes seven-eighths of the whole, being light and colourless.

Medical Properties.—Cajeput oil is a powerful diffusible stimulant and antispasmodic, with some diaphoretic powers; it is somewhat allied both to valerian and camphor in its action, but does not affect the mental faculties when given in large doses, as is the case with these two articles. It is much used among the Malays and on the continent of Europe, but is seldom prescribed in England or this country. It is employed in much the same circumstances in which the others have been found beneficial, as in convulsive and spasmodic affections. In flatulent colic and some forms of gastralgia, a few drops taken on sugar, it has procured much relief, and it is said by Rudolphi to be a good anthelmintic. During the prevalence of the Asiatic Cholera in Europe it was confidently recommended, and in consequence rose enormously in price, but a short trial with it proved that it possessed no power over the disease, beyond that of any other stimulant. As a stimulating embrocation in chronic rheumatism, it has attained much celebrity, and has certainly proved more beneficial than most of the external means of the same character, but is not equal to the *Ol. monardæ*. It is sometimes effectual in removing toothache, by application to the carious tooth.

It has also been used with some success to protect woollen articles and specimens in natural history from the attacks of insects; and it is the best solvent for Caoutchouc. Another species, the *M. myrtifolia* or tea-tree, is abundant in New Holland, where the leaves were formerly used by the colonists as a substitute for the Chinese tea (Bennet, *Wanderings*, i. 95).

Caryophyllus.—*Linn.*

Calyx with the tube cylindrical, and the limb 4-partite. Petals 4. Stamens distinct, arranged in four parcels, inserted in a quadrangular hollow near the calycine teeth. Berry 1—2-celled; 1—2-seeded.

A tropical genus composed of trees with opposite, rigid, dotted leaves, and cymose, somewhat corymbose, terminal and axillary flowers. It was first established by Tournefort, and adopted by Linnæus, but afterwards included in that of *Eugenia* by Thunberg, in which he was followed by Willdenow and others; Persoon restored it to its original rank and name, as he found it differed from *Eugenia* in the fruit, which is dry and 1—2-celled in *Caryophyllus*, and fleshy and many-seeded in the former.

C. aromaticus, *Linn.*—Leaves obovate, oblong, acuminate at both ends. Cymes axillary and terminal, many-flowered.

Linn, *Sp. Pl.* 735; Woodville, t. 135; Stokes, *Mat. Med.* iii. 73; Stephenson and Churchill, ii. 95; *Bot. Mag.* 2749.

Common Names.—Clove tree; Clove spike-tree.

Foreign Names.—Giroflier, *Fr.*; Garfano aromatico, *It.*; Gewürznäglen. *Ger.*

Fig. 147.

C. aromaticus.

Description.—A handsome tree with a trunk from fifteen to thirty feet high, with many slender, opposite branches, forming a dense, pyramidal head. The leaves are opposite, persistent, rigid, with a strong midrib and parallel lateral nerves; ovate, lanceolate, entire, smooth on both sides, with numerous pellucid dots, and supported on long, slender footstalks, which are extremely aromatic. The flowers are odorous, in short, terminal cymes, trichotomously divided, and jointed at every division. The calyx is superior, and consists of a cylindrical tube, and four concave, spreading segments; it is first green, but afterwards red. The petals are four, ovate, concave, yellowish-red, larger than the calyx, coherent by their edges, and forming a calyptra which is caducous. In the centre of the calyx, and at the top of the ovary, is a quadrangular, elevated line, into which the stamens are inserted; these are longer than the petals, and bear small, yellow, ovate-cordate anthers. The ovary is oblong, crowned by a short, subulate style. The berry is purplish, elliptical, 1—2-seeded. Seed covered with a soft, thin integument.

The Clove tree is a native of the Moluccas, where it was abundant previous to their conquest by the Dutch, who, in a spirit of selfish monopoly,

destroyed them, except in the island of Amboyna, over which they had full control, and this is still the principal source of them, as they grow to full perfection in that group of islands alone. In 1770 the French obtained plants, which were disseminated to other parts of the East Indies, to their possessions in America, &c., where the tree is now extensively cultivated, but the best cloves still come from the Moluccas, those from other places being smaller, and containing less oil.

It is stated that just before the Portuguese took possession of Amboyna, the seeds of the tree were secretly carried to Amboyna, Ceram, &c., from Machian, and in fifty or sixty years these islands were covered with young plants. On the conquest of these places by the Dutch, they extirpated them with the exception of those in Amboyna, Ternate, and two or three other neighbouring islands, in order that the product might not be too plentiful. In 1769, they ordered that the number of trees should not exceed 500,000, and a few years afterwards, one-tenth of these were ordered to be destroyed. This narrow policy caused constant insurrections on the part of the natives, so that Valentyn observes, "It would have been better, if, instead of extirpating their trees alone, we had at the same time exterminated this revengeful and sanguinary nation."

In an extremely interesting account of this tree by Sir W. Hooker (*Bot. Mag.*), he says, that it is difficult to ascertain when the clove first became known to Europeans. It most certainly is not the *caryophyllum* of Pliny; and the first distinct notice of it is by Paulus Æginetus, a Greek physician of the seventh century; Sprengel is of opinion that Simeon Seth was the first who mentioned them, whilst Sir J. E. Smith supposes that they are the *Carunfel* of Serapion, and the *Carunfel bellum* of Avicenna. J. Bauhin asserts the inhabitants of the Moluccas were unacquainted with the value of this spice, until some Chinese vessels visited them. Be these statements true or not, cloves were scarcely known or used in Europe until after the conquest of the East Indies by the Portuguese, Dutch, &c.

The Clove is the unexpanded flower, the corolla forming a ball or sphere at the top; and the calyx, the tapering somewhat quadrangular base, resembling a nail, whence the common name from the French *clou*, and it may be noticed that the same designation is given to it in most European languages, it being called *Naghel* by the Dutch, *Clavo*, by the Spaniards, and *Chiodo* by the Italians. Cloves are gathered by hand, or beaten from the trees by slender rods, and dried in the sun, or by means of a fire, which latter plan always gives an inferior article. The clove is from five to ten lines long, and from one to one and a half thick; they are of a dark-brown colour, with a yellowish-red tint. When good, they are dark, heavy, perfect, of a strong, fragrant odour, hot, acrid taste, and when pressed with the nail, should give out oil. When fresh gathered, they yield on simple pressure a fragrant, thick, reddish oil. Sometimes they have a considerable portion of this oil drawn from them, and are then mixed with those that retain it. When they have been thus treated, they are paler, look shrivelled, and the ball at top is broken. Another mode of deceiving purchasers is to place the cloves near a vessel of water, by which they not only become plumper, but gain considerably in weight.

The oil of cloves is pale, reddish-brown, becoming darker by age, extremely pungent and acrid, and is heavier than water. Much of that imported from the East Indies is adulterated with other oils. Cloves contain volatile oil, resin, tannin, &c.; the oil, which is the active principle, consists of two oils, a heavy and a light, and on being kept for some time, furnishes a pecu-

liar deposit, which has been termed *Eugenin;* this is a fatty body, resembling Stearoptene.

Medical Properties.—Cloves are the most stimulating of the aromatics, but are principally employed for culinary purposes, as a flavouring ingredient. In medicine their main use is as an addition to other remedies, either to disguise their nauseous taste, or to correct their operation. The essential oil is added to some extracts for the same purposes, and is a popular remedy for toothache. The infusion of cloves is a warm and grateful stomachic, and has been advantageously used to relieve nausea, flatulence, and other dyspeptic symptoms. An aromatic syrup or liqueur is also prepared from them, and they are used in some articles of perfumery.

The ripe fruits are preserved with sugar, and are much esteemed as an aid to digestion; in a dried state they have been imported under the name of *Mother of cloves;* they are much less aromatic than the unripe clove. Guibourt states that the peduncles are also imported into France, and used by the distillers. Lesson (*Voy. Med.*), says that he saw at Amboyna what is called the *Royal clove*, which has a double calyx, is smaller than the ordinary clove, much more aromatic, and bears a very high price. This must, of course, be the product of a tree belonging to another genus.

Eugenia.—*Linn.*

Tube of the calyx roundish, limb 4-cleft. Petals 4. Stamens indefinite, distinct. Berry nearly globular, crowned by the persistent calyx; 1—2-celled, 1—2-seeded.

This genus is very closely allied to *Myrtus;* and the species to be noticed was included in it by Linnæus, but has been removed to *Eugenia* by De Candolle and others. Lindley, in the Encyclopædia of Botany, made it the type of *Pimenta*, attributing a 5-cleft calyx and 5 petals, which are not noticed by other writers, who invariably speak of these parts as quadripartite. All the species are trees and shrubs, and are inhabitants of warm climates.

E. pimenta, *De Candolle.*—Leaves oblong-lanceolate, pellucid, dotted. Flowers in trichotomous panicles.

Myrtus pimenta, Linn., *Sp. Pl.* 576; Woodville, i. 26; Stephenson and Churchill, ii. 124; *E. pimenta*, Lindley, *Fl. Med.* 76.

Common Names.—Pimento; Allspice; Jamaica Pepper; Bayberry Tree.

Foreign Names.—Pimente, *Fr.;* Pepe dell Giamaica, *It.;* Gewürzmyrte, *Ger.*

Description.—A handsome evergreen tree, with a straight trunk about thirty feet high, much branched towards the top, and covered with a smooth gray bark. The leaves are opposite, on short footstalks, oblong-lanceolate, smooth, shining, pointed, of a deep-green colour. When recent they have an aromatic taste, and abound in an essential oil. The flowers are small but numerous, and are produced in trichotomous panicles at the extremity of the branches. The calyx is formed of 4 roundish sepals. The petals are 4, reflected, of a greenish-white colour. The stamens are numerous, longer than the corolla, of the same colour as the petals, with rounded, white anthers. The style is simple, with an obtuse stigma. The fruit is a smooth, shining, succulent berry, crowned with the persistent calyx, of a black or purplish colour when ripe, and containing two reniform, flattish seeds.

The Allspice-tree is a native of the West Indies and South America; it grows abundantly in the hilly parts of Jamaica, and is also cultivated largely in that island. It begins to bear fruit when three years old, and arrives at maturity at seven, and grows best in a calcareous soil, covered with a light mould. The berries are collected before they are ripe, and dried on cloths

spread on terraces. The first day or two they are often turned, so as to be fully exposed to the sun. When they begin to dry, they are frequently winnowed, and are removed under cover at night. In about two weeks they become dark, dry, and wrinkled, and are then packed. Some planters kiln-dry them, which expedites the process very much. It is said that nothing can be more fragrant than the odour exhaled from these trees, especially when in blossom.

Pimento is in round, brown, dull, roughish berries, rather larger than a corn of black pepper; they consist of an external, hard, brittle shell, which is paler within, and encloses two dark-brown seeds. They have an aromatic, agreeable smell, and a strong, clove-like taste. On analysis they have been found to contain volatile oil, a green oil, astringent extract, a gummy extract, &c. &c. The kernels contain less volatile oil, and more astringent extract, than the shell. The volatile oil is of a greenish-yellow colour, and is very pungent.

Medical Properties, &c.—Pimento is but little used in medicine, being only employed to correct the operation of other medicines, especially some of the drastic purgatives, and to stimulate the stomach in some forms of dyspepsia. The oil, like that of cloves, is used to cure the toothache. As a condiment, however, its use is very general, and the consumption of it very great.

Eucalyptus.—*Heretier.*

Tube of calyx obovate or globose, cup-shaped, permanent, limb entire, deciduous. Petals none. Stamens distinct, numerous. Capsule 4-celled, or by abortion 3-celled, many-seeded, opening at the apex.

This genus is peculiar to Australia, and contains numerous species, having simple, entire, glaucous leaves, with numerous apetalous flowers. The leaves are dotted with numerous vesicles of oil, and it is probable that on distillation they would afford a product analogous to cajeput. The species differ much from each other in their physical qualities. From one, *E. resinifera*, is obtained a concrete juice, soluble in warm water and known as *Botany Bay Kino*. It is in irregular, odourless fragments of a dark-red colour in the mass, but of a transparent, ruby-red in small pieces. When chewed it sticks to the teeth, and has an astringent taste. Pereira (ii. 531) is of opinion that it is composed of a peculiar substance, *Eucalyptin*, somewhat analogous to pectin and tannin. White (*Jour. Voy. to New S. Wales*, 231) employed it with some success in bowel complaints, and its powers in these affections have been confirmed by Alibert (*Mat. Med.* i. 7, 8). Ainslie states that it is the only kind to be found in the Indian bazaars (*Mat. Ind.* i. 186). See Bennet, *Wanderings*, i. 142.

E. robusta secretes a sweet gum, which is found in cavities in its stem between the annual layers of wood; it is of a rich vermilion or red colour. *E. mannifera* exudes a manna-like substance, which has analogous properties with that article, but is not as nauseous. It is not produced by insects, and only appears in the dry season, when it coagulates and drops from the leaves in large particles; some other species afford a similar product. It is sweet and mucilaginous; and, though generally aperient, does not act on some persons (Bennet, *Wanderings*, i. 319).

Other species yield large quantities of tannin, which has become an article of export to England. The *E. Gunnii*, on being wounded, exudes a large quantity of a cool, refreshing, and somewhat aperient fluid, which is used as a beverage in Tasmannia; when kept any time, it ferments and acquires the properties of beer. The *E. globulus* has an aromatic bark, leaves, and fruit, which are used as substitutes for spices.

Mr. Bennet (*Wanderings*, i. 165) states that several species of Eucalyptus afford a camphorated oil, closely resembling the cajeput. Some contain it in such abundance as to cover the hand with oil if one of the leaves be gently rubbed against it. This oil has been used in medicine.

Order 49.—LYTHRACEÆ.—*Lindley.*

Calyx tubular and persistent, enclosing the 2—4-celled ovary, but free from it. Petals deciduous, sometimes wanting, inserted between the lobes of the calyx. Stamens definite, inserted below the petals. Styles perfectly united into one. Capsule membranaceous, often 1-celled by the obliteration of the dissepiments.

This order is composed principally of herbs with angled or four-sided branches, and opposite, verticillate, or alternate, entire, not dotted leaves, not furnished with stipules. The species are mostly tropical, and inhabitants of wet, marshy places; some few are indigenous to temperate regions. The general character of the species is astringency, a few are somewhat acrid; but their medical properties are not well known. Some, however, have been employed for various purposes; and one has been long celebrated for its tinctorial qualities; this is the *Lawsonia inermis*, from which the *Henné* of Egypt is obtained, and has been in use for staining the nails of the hands and feet from the earliest ages, as traces of it are found on mummies. It is also used in many parts of Asia for the same purpose. The flowers are very fragrant, and much esteemed. In India an extract is in much repute in cases of lepra and obstinate cutaneous affections. The bark and leaves of *Lagerströmia reginæ* are said to be purgative and hydragogue and the seeds purgative. The flowers of *Heimia salicifolia* are employed in Mexico to excite copious perspiration in venereal complaints. In Brazil a decoction of *Cuphea balsamora* has been found useful in intermittent fevers. In India, according to Ainslie (*Mat. Ind.*, ii. 92), the leaves of *Ammania vesicatoria*, which have a strong muriatic smell, are used to raise blisters in rheumatism.

Fig. 148.

Lawsonia inermis.

Lythrum.—*Linn.*

Calyx cylindrical, striate. Teeth short, 4—6, usually with as many minute intermediate teeth or processes. Petals 4—6. Stamens as many or twice as many as the petals, inserted above the middle or near the base of the calyx, nearly equal. Style filiform. Stigma capitate. Capsule oblong, 2-celled, many-seeded, enclosed in the calyx.

The species of this genus are mostly herbaceous, in some few cases assuming a shrubby appearance. They all have entire leaves, and axillary flowers, of a purple or white colour. One species only, deserves notice, and that rather from its former reputation than from any marked remedial qualities it possesses.

L. salicaria, *Linn.*—Leaves lanceolate, cordate at base. Flowers sessile, in a long spike. Petals 6—7.

Linn., *Sp. Pl.* 640; Torrey and Gray, *Fl.* i. 482; Stephenson and Churchill, iii. 146; Woodville, v. 65.

Common Names.—Loosestrife, Purple Willow Herb.

Foreign Names.—Lisimaque rouge, *Fr.;* Salicaria, *It.;* Braune Weiderich, *Ger.*

Description.—Root perennial, woody, sending up several erect, leafy, slender, reddish stems, three or four feet high, quadrangular or even hexangular near the root. The leaves are mostly opposite, sessile, lanceolate, pointed, entire, the upper ones resembling bracts. The flowers are in terminal spikes, in numerous axillary whorls, six in each, of a purplish colour, inodorous. The calyx is inferior, cylindrical, striated, downy or hairy, with twelve marginal teeth, six of which are long, subulate, erect, and reddish; the others minute, ovate, concave, and inflected. The petals are six, elliptic-oblong, equal, waved. The stamens are twelve, filiform, the six alternate ones shorter, bearing roundish anthers. The ovary is ovate-oblong, with a simple style and capitate stigma. The capsule is small, elliptical, 2-celled, and enclosed in the tube of the calyx.

This plant is found in various parts of the world, being an inhabitant of Europe, Asia, North America, and New Holland, growing in wet situations. It is inodorous, but has a herbaceous, mucilaginous, somewhat astringent taste. It has not been analyzed, but probably contains tannin and much mucilage.

Medical Properties.—It is a demulcent and astringent, and was at one time much celebrated as a remedy in diarrhœa and dysentery, for which it is even now a highly popular domestic medicine in Ireland. Many German practitioners likewise speak of it in high terms in bowel diseases, but of late years it is seldom prescribed; and in this country it is never administered in regular practice, though sometimes employed as a domestic remedy, especially among our German population. It is given in powder, in drachm doses, twice or three times a day; but more generally in decoction, made by boiling an ounce of the root in a pint of water, of which the dose is a fluid ounce to twice that quantity, to be repeated as occasion may require.

Order 50.—ONAGRACEÆ.—*Jussieu.*

Calyx adherent to the ovary, and usually produced beyond it into a tube. Petals usually 4, and the stamens as many or twice as many, inserted into the throat of the calyx. Ovary commonly 4-celled. Styles united. Stigmas 4, or united into one. Fruit generally capsular.

An order of herbaceous, rarely shrubby plants, with alternate or opposite leaves, not dotted nor furnished with stipules; the flowers are generally showy. The larger number of the species are peculiar to the American continent, especially on the western side of it. They afford many ornamental plants much prized by horticulturists. Their medical properties are very little known, but, as far as ascertained, are demulcent and emollient.

Œnothera.—*Linn.*

Tube of the calyx prolonged beyond the ovary, deciduous. Segments 4, reflexed. Petals 4, equal, mostly obcordate, obovate. Stamens 8, nearly equal or unequal. Ovary 4-celled, with numerous horizontal or ascending ovules. Stigma 4-lobed or capitate. Capsule various in form, 4-valved, many-seeded.

A very extensive genus, of which upwards of sixty species are indigenous to North America. They are sometimes suffrutescent, with axillary or terminal flowers, which in some species open only in the evening or at night. The roots of some of them are edible, and resemble in taste the Salsafy.

Œ. BIENNIS, *Linn.*—Stem erect, mostly villous, or hirsute. Leaves ovate-lanceolate, flat. Flowers terminal, sub-spicate, sessile, with the stamens shorter than the corolla.

Linn., *Sp. Pl.* 346; Torrey and Gray, *Fl.* i. 492; Griffith, *Jour. Phil. Coll. Pharm.*

Common Names.—Evening Primrose, Cure-all, &c.

Description.—Stem from three to five feet high, rough, hairy, and branching. Radical leaves petiolated, cauline leaves sessile; both pubescent and more or less dentate. Flowers in a terminal, somewhat leafy spike, of a pale-yellow colour. Tube of the calyx much longer than the ovary, and from one-half to two or three times longer than the segments. Stamens obliquely declined, a little shorter than the somewhat obcordate petals. Ovary sessile, 4-grooved. Capsule oblong, somewhat tapering above, four-sided or terete, valves 1-ribbed. Seeds numerous, arranged in two rows in each cell.

This species is very common in this country, and is naturalized in Europe. It is exceedingly variable, and numerous species have been indicated on its varieties which do not appear entitled to that rank. When it grows in secluded situations, the leaves become covered with a white mucor, giving them a highly pubescent appearance; and by cultivation the flowers become of a much deeper colour and of a larger size. They expand in the evening, just at the commencement of twilight, and continue open till the sun begins to exert some power the succeeding morning. The same flower does not expand a second time. Pursh states that he has "frequently observed a singularity in this plant, and it might be interesting to make further inquiry into its cause; it is that in a dark night, when no objects can be distinguished at an inconsiderable distance, this plant, when in full flower, can be seen at a great distance, having a bright white appearance, which probably may arise from some phosphoric properties of the flowers."

Medical Properties.—The bark and leaves in a recent state are mucilaginous, and leave a slight sensation of acridity, after being chewed. This latter is not so marked after they have been dried, though the mucilage does not appear to be diminished. Some years since, hearing of the efficacy of a decoction of the plant in infantile eruptions, I made a trial with it in several cases of an obstinate character, which had resisted other modes of treatment, and became satisfied that it was highly beneficial; and this opinion has been confirmed by subsequent experience with it. The plant is to be gathered about the flowering season, and the small twigs with the bark of the large branches and stem, retaining the leaves with them, to be dried in the shade. Of these a strong decoction is to be made, with which the eruption is to be bathed several times a day. Schoef states that the *O. mollissima*, which is probably the lanescent variety of this plant, is a vulnerary, and in domestic practice, in many parts of the country; the Evening Primrose is a favourite emollient in ulcers.

From some experiments, it appears to possess the abstergent qualities of the *Quillaja saponaria*, though not in an equal degree, but fully as much so as the *Saponaria officinalis*.

Group XX.—Cucurbitales.

ORDER 51.—CUCURBITACEÆ.—*Jussieu.*

Calyx 4—5 (rarely 6) sepals, united in a tube, and in the fertile flowers adherent to the ovary. Petals as many as sepals, usually more or less united into a monopetalous corolla, which coheres to the calyx. Stamens 5 or 3, inserted into the base of the corolla or calyx, either distinct or variously united by their filaments and contorted anthers. Ovary

2—5-celled, the thick and fleshy placenta often filling the cells, or carried back so as to reach the walls of the pericarp, the dissepiments often disappearing during its growth. Stigmas thick, dilated, or fringed. Fruit (a pepo) usually fleshy, with a hard rind, sometimes membranous. Seeds flat, often arilled, exalbuminous. Cotyledons foliaceous.

A very extensive order of tropical and sub-tropical plants, with a few extra-tropical species. They are all succulent herbs, climbing by tendrils, with alternate, and palmately-veined or lobed, rough leaves. The general character of the order is acridity and a drastic purgative power, which is found in some part of the plant; for, although the fruits of many of them are edible and bland, the roots and leaves are usually active and dangerous. In some cases, the fruit or its pulp is eminently powerful, as in the Elaterium and Colocynth, and there is reason to believe that the edible kinds owe their freedom from acrimony to cultivation, for some of them in a wild state are active and poisonous. The seeds are usually mild and oleaginous, and in one species, the *Telfairia pedata*, are very large, and are used as an article of food in Africa; they are said to be very agreeable, and when pressed to yield an abundance of oil, equal in flavour to that of the olive. De Candolle states that none of the seeds of this order are active or poisonous, but in this he was mistaken, as those of several species of *Feuillæa* are intensely bitter and violent emetics and cathartics, and those of *Anisospermum passiflora* and *Hypanthera guapeva* are stomachic in small doses, but purge in large ones. A decoction of those of the Watermelon acts as a mild diuretic.

Fig. 149.

T. pedata.

Momordica.—*Linn.*

Petals 5, adnate to the base of the calyx, deciduous. Anthers all cohering. Ovules in a single row in each cell. Stigma 2-lobed. Fruit a capsular, elastically-bursting three-valved pepo.

The species of this genus are principally natives of India, but one is common to that country and Florida; though it is doubtful whether it has not been introduced into the latter. Most of the fruits are mild, and are esteemed as vulneraries.

M. balsamina, *Linn.*—Leaves smooth, widely-palmate.

Linn., *Sp. Pl.*, 1453; Descourtilz, *Flor. Med. Antill.* iii. 62.
Common Name.—Balsam Apple.
Foreign Names.—Pomme de Mervielle, *Fr.*; Balsamina, *It.*

Description.—Stem climbing, slender, angular, furrowed. Leaves lobed, smooth, of a bright-green colour, petiolated. Flowers axillary, of a whitish-yellow colour. Fruit tuberculated, oblong, somewhat resembling a cucumber, but more pointed at the ends, of a yellowish-red colour when mature, bursting elastically, and discovering the seeds, which are reddish, crenulated, and marked with waved elevations.

It is a native of India, but is now naturalized in the West Indies, and according to Rafinesque, if it is his *Neurosperma balsamina*, as is supposed by Seringe, is also found in Florida. It is frequently cultivated in gardens, on account of the beauty of its fruit.

This fruit has long been used in Syria and other Eastern countries as a vulnerary, for which purpose, Hasselquist (*Iter. Palest.*) informs us, it is cut

open and infused in sweet oil, which is exposed to the sun for a few days, until it becomes red, and then preserved for use; dropped on cotton, and applied to a wound, it is considered as a vulnerary almost equal to the balsam of Mecca. It is used in the same way in Europe and this country. Dr. Descourtilz (*Flor. Med. Antill.* iii. 62) states that it is acrid and poisonous, but that an extract from it has been found of benefit in dropsies as a hydragogue purgative. In Manilla a decoction of the plant is used as an emetic. Rafinesque (*Med. Flor.* ii. 245) says that the root is useful in jaundice and liver complaints, and that the powder is emetic.

Several other species are also active. The leaves of *M. charantia*, which are bitter, and of a strong odour, are vermifuge, and are also employed in decoction in Jamaica to promote the lochial discharge. (Browne, *Jam.*) The root of *M. dioica* is recommended by Hindoo physicians in the form of an electuary, in bleeding piles, and bowel complaints. (*Ainslie*, ii. 274.)

Citrullus.—*Necker.*

Corolla persistent, 5-parted, sub-rotate. Anthers tridelphous, bilocular. Style trifid. Stigma obcordate, convex. Fruit a fleshy or dry and fibrous, many-seeded peponida.

This genus is very variable in its properties, especially as regards the fruit, in some species being edible, as in the Watermelon, whilst in others it is acrid, poisonous, and purgative, as in the Colocynth, &c. It is probable that the roots and stems of all the species are endowed with active properties.

C. colocynthis, *Linn.*—Leaves many-lobed; petioles as long as the lamina. Fruit globose, smooth, bitter.

Cucumis colocynthis, Linn., *Sp. Pl.* 1092; Woodville, iii. 175; Stephenson and Churchill, iii. 138; *Citrullus colocynthis*, Royle, 396.

Common Names.—Colocynth; Bitter Cucumber.

Foreign Names.—Coloquinte, *Fr.;* Coloquintida, *It.;* Koloquinthen, *Ger.*

Fig. 150.

C. colocynthis.

Description.—Root annual, whitish. Stems herbaceous, trailing, angular, branched, rough with short hairs. The leaves are on long petioles of a triangular form, deeply and obtusely sinuated, of a bright green on the upper surface, paler, and clothed with whitish hairs beneath. The flowers are solitary, axillary, and of a yellow colour. The calyx of the male flower is bell-shaped. The corolla is monopetalous, campanulate, divided at the margin into five pointed segments. The stamens are three, short, distinct; two are bifid at the apex, or rather have two anthers. The female flower is like the male, but the filaments are destitute of anthers. The ovary is inferior, large, with a very short cylindrical style, furnished with three thick stigmas. The fruit is a round pepo, the size and colour of an orange, and smooth on the outside when ripe; the rind is thin but solid; internally it is trilocular, each cell containing numerous ovate acute, compressed seeds, enveloped by a white spongy pulp.

This plant is a native of the Cape of Good Hope, Japan, India, Nubia, Syria, &c., and is cultivated in Spain and Italy. It is supposed to be the gourd alluded to in the Old Testament (2

Kings, iv. 39, 40) as poisonous. It was known to, and employed by Hippocrates, not as a purgative, but as a pessary to induce menstruation. Other ancient writers allude to it, and Pliny speaks of it under the name it now bears. There are two varieties mentioned by Ray, the *major* and *minor*, which agree with the Spanish and Mogadore of the present day. It is imported into this country from various ports in the Mediterranean, and all that comes to this market is of the first variety, and is always deprived of its rind. It is in the form of round, white, light balls, composed of a spongy, dried pulp, containing numerous seeds. The pulp is tough, and intensely and disagreeably bitter. The seeds, when perfectly freed from the pulp, are bland and oleaginous, and are used in some parts of Africa as an important article of food.

Colocynth has been analyzed by several chemists, and found to contain: bitter matter (*colocynthin*), extractive, resin, gum, &c.; the active principle is the bitter matter, which forms about an eighth of the whole pulp; it is a yellowish-brown, translucent, brittle substance, soluble both in water and alcohol, but most readily so in the latter. The part used in medicine is exclusively the pulp, which from its nature being powdered with great difficulty, is seldom administered in substance, but is usually prescribed in the form of extract, either alone or variously compounded with other ingredients.

Medical Properties.—In small doses, Colocynth is a safe and valuable purgative of the hydragogue class; in large doses it operates as a drastic, and in over-quantities acts as an acrid poison. In its action it resembles gamboge, but acts more energetically on the colon. It is scarcely ever given alone; but there is no purgative more habitually prescribed than the compound extract, either alone or in combination with calomel. The dose of colocynth is from two to eight grains, mixed with bland powder; of the extract from five grains to a scruple, which is also that of the compound extract. No preparation is better suited to cases of habitual constipation than this, as it operates effectually, but at the same time mildly. Colocynth and its preparations may be employed to fulfil every indication for which purgatives are administered; and it would therefore be superfluous to notice its powers in any individual disease.

Some other species are possessed of the same properties as the *C. hardwickii*, a native of India. It has a very bitter pulp, and is similar in quality to Colocynth. (Royle, *Illus.* 220.) Another Indian species, *C. pseudo-colocynthis* (Royle, *Illus.* 220), is in common use in Northern India as a purgative; it is said to be fully equal to the officinal article. The Colocynth of the Cape of Good Hope may also prove distinct, as it certainly bears a much milder fruit, since this is used as a pickle, and is said to possess no bitterness. Our native species, *C. perennis*, found west of the Mississippi, is probably active, as the fruit is extremely bitter and fetid.

Ecbalium.—*Richard.*

Corolla 5—6-cleft; anthers tridelphous, ovules in two rows in each cell. Stigmas 3, 2-horned. Fruit an elastically and irregularly-bursting peponida.

This genus was established by Richard to contain certain species of Momordica, and appears to be a very natural one.

E. elaterium, *Linn.*—Leaves cordate, sinuated or lobed, rough. Stem short without tendrils. Fruit elliptical, hispid.

Momordica elaterium, Linn., *Sp. Pl.* 1434; Woodville, ii. t. 71; Stokes, *Bot. Mat. Med.* iv. 166; Stephenson and Churchill, i. 34; Lindley, *Fl. Med.* 85; *Ecbalium elaterium*, Rich., *E. officinale*, Nees and Eberm. iii. 101.

Common Names.—Squirting or Wild Cucumber; Wild Balsam Apple.
Foreign Names.—Concombre sauvage ou d'ane, *Fr.;* Concomero salvatico, *It.;* Esselsgurten, *Ger.*

Fig. 151.

E. elaterium.

Description.—Root fleshy and large, giving rise to several thick, round, rough, trailing stems, divided into many branches, destitute of tendrils. The leaves are irregularly-cordate, somewhat lobed, rough, hairy, of a grayish-green colour above, and paler beneath, supported on long petioles. The flowers are axillary, of a straw-yellow colour, and both male and female on the same plant; the males on short peduncles, the female, sessile on the ovary; the corolla is composed of five acute segments, tomentose and veined with green; the stamens are short, inserted into the base of the corolla, and support recurved, double-headed, orange-coloured anthers; the style is short, cylindrical, three-cleft and terminated by an oblong stigma. The fruit is watery, of a coriaceous texture, pendulous, oblong, of a grayish colour, and closely set with short bristles. The seeds, when mature, are black. When ripe, this pepo bursts and throws out, with some violence, the juice and seeds, through a hole at the insertion of the footstalk.

Fig. 152.

E. elaterium.
a. Pepo discharging its seeds and juice.
b. Stalk. *c.* Transverse section of pepo.

The Wild Cucumber is a native of the south of Europe, growing in waste places; being a hardy annual it will grow in most parts of the United States without much attention. Its specific name was used by Hippocrates for all drastic purgatives, but he appears to have known and employed this article, and Dioscorides, describes the method of preparing it for use. Pliny also alludes to it, and it was familiar to most of the medical writers of the middle ages. In consequence of the peculiar manner the mature fruit expels its seeds, Richard removed the plant from *Momordica* and made it the type of a new genus which he called *Ecbalium;* in this he has been followed by Nees von Esenbeck and others.

All parts of the plant are actively cathartic, and a century since, the root was the part principally used. James (*Pharmacop. Universalis*), says, "after an incredible number of experiments, M. Boulduc found that an extract from its

dried root was the best preparation he could obtain from it, since it was at once a mild and powerful hydragogue." Geoffroy and Lemery also speak of the root as powerful, and as much used as the fruit; the active portion of this latter was not understood, it was termed "*extractum elaterii*," but it is not an extract, nor is it an inspissated juice, nor a fecula as it has been successively termed. In consequence of the uncertainty respecting it, Dr. Clutterbuck instituted a series of experiments which conclusively proved that "the most active principle belonging to this plant, is neither lodged in the roots, leaves, flowers, nor stalks, in any considerable quantity; nor is it to be found in the body of the fruit itself, nor in the seeds contained within it: it was only in the juice around the seeds therefore that it could be looked for, and here it will be found." On these experiments of Dr. Clutterbuck, the processes now followed have been based; these are to slice the fruit and permit the juice to drain off, either spontaneously or aided by pressure; the fluid thus obtained deposits a pale-green substance, which is what is termed elaterium; the quantity afforded by a fruit is very small, as forty fruits only produced six grains. This substance being insoluble in water, a question has arisen as to what kept it in a state of solution in the juice; which has been solved by Dr. A. T. Thomson: he suggests that the elaterium does not exist in a formed state in the juice, and is the result of an absorption of oxygen by the fluid, as this is at first nearly colourless and transparent, and does not become turbid or make any deposit until it has been exposed to the action of the air; if the progress of this change be examined by means of a microscope, it will be seen that there is a gradual formation of minute crystals, mingled with vegetable matters. The elaterium of the shops, therefore, consists of these crystals (elaterin) mixed with green colouring matter, cellular tissue, starch, &c., and according to the care taken in the preparation, will be the proportional quantity of this active principle, as it varies from 5 to 44 per cent.

The best elaterium is in light, friable, thin, somewhat curled flakes or fragments, of a pale grayish-green colour, which changes to yellowish by exposure. The taste is acrid and bitterish, it has a faint animal odour. Numerous analyses have been made of it with very different results as to the proportionate quantity of the active principle, but agreeing in other respects, showing that these discrepancies have arisen from the different degrees of purity of the specimens experimented upon. *Elaterin* is separated by making an alcoholic solution of elaterium, evaporating to the consistence of thin oil, and adding boiling distilled water, when the elaterin will be gradually separated in a crystalline form (Morries, *Journ. Phil. Col. Pharm.* iii. 130). This substance is in silky crystals, very bitter but inodorous, neither acid nor alkaline, soluble in alcohol, but insoluble in water. It is extremely active, as one-tenth of a grain will purge actively, and Dr. Golding Bird is of opinion that one-sixteenth of a grain is enough to commence with. In consequence of this extreme activity it is seldom used, the elaterium itself, if good, being sufficiently active for all purposes for which it is required.

Elaterium, as has been seen from the above, is variable in its effects, owing to the difference in its quality; when good, it is the most powerful purgative known, the only article that approximates to it being Croton oil.

Medical Properties.—From what has been said, it will be evident that elaterium is a purgative of great violence of action, and is to be resorted to only where a powerful impression is wished to be made on the intestinal canal. Its principal use is to excite copious watery evacuations in dropsy, in certain cases of which it has proved very useful, but should never be given when inflammation or organic disease of the bowels exists, and is of course contra-indicated when the patient is debilitated; but even in the

cases most favourable to its use, its effects must be closely watched. It is also beneficial as a revulsive in cerebral affections, and has been employed with good effect in obstinate constipation depending on sluggishness of the bowels. Dr. Clutterbuck speaks highly of it (*Obs. on Epidem. Fev.*) in febrile affections, and states that he has never found any single remedy equally efficacious in cutting short the disease. The dose of elaterium is from one sixteenth to half a grain; it is usually given in the form of pills. Elaterin is given in powder in combination with bitartrate of potash or in solution in alcohol, in doses of one-sixteenth to one-eighth of a grain. (See Dunglison, *Gen. Therap.* i. 202.)

Luffa.—*Tournefort.*

Petals 5, inserted on the base of the calyx; anthers distinct, or 2—3-delphous. Style trifid; stigmas reniform or bipartite. Fruit at length dry, and internally fibrous, usually opening by a terminal lid, rarely indehiscent.

A well-marked genus, established originally by Tournefort, and subsequently recognised by Cavanilles and Wight, (*Ann. Nat. Hist.*) Most of the species are possessed of active properties, and none of them are edible.

L. operculata, *Linn.*—Leaves obscurely 5-angled, petioles long-channelled. Fruit an oval, trilocular capsule.

Momordica operculata, Linn., *Sp. Pl.* 1090; Commelin, *Plant. rar.* t. 22; Hancock, *Jour. Phil. Coll. Pharm.* ii. 144.

Description.—Root fibrous. Stem very long, 5-angled. Leaves distant, angular, somewhat 5-lobed, roughly pubescent, on long-channelled petioles. Flowers yellow, the males in clusters on a common receptacle; females solitary, elevated above the germ on a columnar torus, which becomes the lid or operculum of the capsule. Petals thrice the length of the calyx, obovate, spreading, obtuse. Stamens five, cohering. Ovary large, angular; style cleft. Fruit an oval, trilocular, prickly, brown, dry capsule, with a deciduous operculum, which on being detached, discovers within a white three-celled reticulum or web-like substance, lying loose, and enveloping black, compressed seeds.

This plant is found in Guiana, where it is abundant. The description of it by Dr. Hancock, does not agree with the characters of *Momordica*, but approaches nearer to those of *Luffa*, and it is probable that more than one plant is confounded under the name of *M. operculata*. The fruit is not a true pepo, but a dry, trilocular capsule with a deciduous lid at the apex. The web, or reticulum, which is the active portion, weighs about six or eight grains, and is more intensely bitter than any other known substance; when agitated with water it gives out much froth, like soap.

Medical Uses, &c.—Dr. Hancock states it is one of the most active hydragogue purgatives hitherto discovered, and also proves diuretic and sudorific; in small doses it is alterative and stomachic. The mode of administration he prefers is to infuse two of the capsules in a quart of boiling water, with the addition of a tablespoonful of common salt, and agitating well whilst cooling. The dose of this is from one to two fluid ounces. When given in substance, the dose is one grain. Where it is given as a cathartic, it is better to administer the full dose, as it does not act as well in divided portions; when given in infusion, an over-dose is certain of being rejected, and nothing is to be feared from it, for if the evacuations are too profuse, they are readily controllable by opiates and demulcents. When a full dose is taken, the patient should lie down and remain tranquil for an hour or two to prevent nausea. It has been found of great utility in dropsy, and as an enema in colica pictonum. Dr. Hancock

states that it exceeds any thing he has tried; he also employed it, with good results, in some cases of enlargement of the spleen.

It is possible that this plant is the *M. purgans*, Martius, from the fruit of which an extremely bitter extract is made, and which has been found very efficacious in dropsy. The plant described by Dr. Hancock is extremely abundant, he says, in Guiana, and it is well deserving of further trial, for if it is found to fulfil what he has stated of its powers, it will be a valuable addition to the class of hydragogue purgatives, and it appears to be more certain in its effects than Elaterium, and could be afforded at a much lower price.

Several other species of Luffa are active; thus *L. amara*, of India, is extremely bitter, and has a violently emetic and cathartic fruit. The juice of the roasted pepo is used by the natives as a topical application in headache, and the seeds as an emeto-purgative (*Roxburgh*, iii. 715). The *L. bindaal*, is said by Royle to be used in Northern India as a drastic in cases of dropsy.

Many other plants of this order have been found to be endowed with medicinal and active qualities. All the species of *Lagenaria*, or gourds, are fetid, and even poisonous, especially in a wild state. Lindley (*Fl. Med.* 84), states some sailors died from drinking some beer that had been standing in a gourd; and Royle says he learned from a Hindoo physician, that the pulp would occasion violent purging. The fruit of *Melothria pendula*, a native of the West Indies and United States, is extremely drastic; half a one is a dose for an adult, and Martius (*Jour. Chim. Med.* iii. 193) states, that three or four act powerfully on a horse. The fruit of *Tricosanthes palmdta* are considered poisonous, and Ainslie (*Mat. Ind.*) says, that the seeds pounded and mixed with warm cocoa-nut oil is esteemed a valuable application in India in offensive ulcers of the ears and nose. The seeds of *T. amara*, according to Martius, are used in the West Indies as a bitter and astringent, but sometimes prove emetic. The fruit of *T. villosa* acts like colocynth, and that of *T. cucumerina* is reckoned, in India, to be anthelmintic. The root of *T. cordata* is bitter, and has been employed in the same country as a substitute for Columba. The seeds and leaves of *Muricia cochinchinensis*, according to Loureiro (*Fl. Coch.*, 596), are abstergent, and aperient, and are thought beneficial in obstructions of the liver, tumours, &c. The root and seeds of *Sicyos angulata*, a native plant, are bitter and diuretic, (Rafin. *Med. Fl.* ii. 263.)

Bryonia.—*Linn.*

Flowers monœcious or dicœcious. Calyx with 5 short teeth. Petals 5, distinct or united at base. *Males*, stamens 5, triadelphous; anthers flexuous. *Females*, style mostly 3-cleft. Fruit an ovate, or globose, smooth berry, generally few-seeded.

B. dioica, *Willdenow.*—Leaves palmate, 5-lobed, toothed, rough on both sides. Flowers racemose, dicœcious.

Willdenow, *Sp. Pl.* iv. 621; *English Bot.* t. 439; Stephenson and Churchill, i. 64; Woodville, ii. 194.

Common Names.—Bryony; Tetter Berry; Wild Hops.

Foreign Names.—Bryone, *Fr.*; Brionia bianca, *It.*; Zaunrube, *Ger.*

This Bryony is a native of England, and has often been confounded with the *B. alba* of the continent of Europe, which, however, it is identical with in its sensible properties. Although it is now seldom employed as a medicinal agent, it was at one time held in such high repute that it deserves notice, added to which several cases of poisoning by it have occurred, rendering a knowledge of its properties of importance to the physician and medical jurist.

The root, which is the part employed, is spongy, and has a very disagreeable odour, and an extremely nauseous taste, depending on an acrid principle which can be removed by washing, so as to leave a pure and nutritive fecula, which was used in France during a time of scarcity, and found very nutritious. The root has been analyzed by several chemists, and shown to contain fecula, a peculiar acrid principle (*bryonine*), gum, several salts, &c. Collard de Martigny (*Nouv. Bib. Med.* ii. 219) is of opinion, that bryonine, although very active, is not the only purgative principle in the root.

Medical Properties.—Bryony is an energetic purgative and emetic, and was known to the ancients, as both Dioscorides and Pliny recommend the juice in epilepsy, and it was also much used in other cerebral affections, and also in dropsy, and many other complaints. As the properties of the root depend upon the acrid juice, the root should be dried for use in such a way as to prevent the volatilization of this as much as possible. The infusion is the best mode of administering it where its purgative powers are desired; for this purpose half an ounce of the dried root is to be infused in a pint of boiling water, to which some aromatic may be added; of this a wineglassful, taken every four hours, will produce copious evacuations, both from the bowels and bladder. In France the juice is a common domestic purge; this is procured by cutting off the vine, scooping a hole in the root, and collecting the fluid that exudes into it. It was also celebrated for its wonderful anthelmintic powers, and for its emmenagogue qualities. When given in powder, in doses of half a drachm, it acts as an emetic, followed shortly afterwards by purgation. The recent root is capable of blistering the skin, and has been found useful in rheumatic affections, and for the removal of extravasated blood.

Most of the other species are likewise active; the *B. africana*, according to Thunberg, is used at the Cape of Good Hope as an emetic and purgative, and Ainslie states that the seeds of the *B. callosa* are used in India as a vermifuge, and the *B. epigæa*, according to the same authority, is regarded by the Hindoo physicians as one of their most valuable remedies, in dysentery, inveterate venereal affections, and as a vermifuge.

Group XXI.—Saxifragales.

Order 52.—SAXIFRAGACEÆ.—*Jussieu.*

Calyx of 4—5 more or less united sepals, either free from, or more or less adherent to the ovary; persistent. Petals as many as the sepals, rarely wanting. Stamens as many, twice as many, or rarely 3—4 times as many as the sepals. Ovaries usually 2 (sometimes 3—4,) usually united below, and distinct at summit. Seeds numerous.

This very extensive order consists of herbs or shrubs with alternate or opposite leaves; it is divided into four sub-orders, the first of which, the *Saxifrageæ* proper, is composed of herbaceous plants only, whilst the other three are all shrubs. The roots of many of them are astringent, but the only genus that is entitled to notice for its medicinal properties is *Heuchera*.

Heuchera.—*Linn.*

Calyx campanulate, 5-cleft. Petals 5, small. Stamens 5, exserted or included; anthers 2-celled. Styles 2. Capsule 1-celled, with two parietal adnate placentæ; many-seeded, 2-beaked, dehiscent between the beaks.

Almost all the species of this genus are North American; they are perennial, mostly acaulescent herbs, with numerous radical leaves on long petioles; the cauline ones, when they exist, are alternate. The flowers are in panicles, on long scapes. The whole of the species have astringent roots, and may be used indiscriminately, and are known under the common name of Alum root.

H. CAULESCENS, *Pursh.*—Petioles villous. Leaves glabrous, acutely 5—7-lobed, lobes acute, unequally and acutely-toothed. Scape naked, or about 2-leaved; nearly glabrous. Petals linear, spatulate, about as long as the stamens.

Pursh, *Fl. Am.* i. 188; De Candolle, *Prod.* iv. 51; Torrey and Gray, *Fl. N. A.* i. 578, *H. accrifolia;* Rafinesque, *Med. Flor.* i. 241, f. 49.

Description.—Root perennial, yellowish, horizontal. Radical leaves on long, slender, somewhat villous petioles; shaped like those of the maple, base cordate; sharply five to seven-lobed; the segments acute, unequally toothed; the teeth short and acute; hispidly ciliate. Flowers in a loose panicle; the peduncles many-flowered, with linear or subulate bracts. Calyx with five acute teeth. Petals linear-spatulate, about the length of the exserted stamens. Capsule with two beaks, two-celled, many-seeded.

Fig. 153.

H. caulescens.

This species is found in high situations in many parts of the United States, and is identical in its properties with the *H. americana*, and therefore may always be employed in the same cases.

Medical Properties.—The roots of all the species are extremely astringent, and were used by the aborigines as styptics, and as applications to ulcers, and are domestic remedies of some repute for the same purposes in many parts of the country. They are also said to form the basis of some of the cancer powders of empirics. They have been found useful in aphthous sore mouth, and may be employed wherever the powerful astringents are indicated. From some experiments I have made with them, it seems probable that an extract might be used as a substitute for Rhatany or Catechu.

Group XXII.—Umbellales.

Order 53.—APIACEÆ.—*Lindley.*

Calyx coherent with the surface of the ovary, its limb entire, five-toothed or obsolete. Petals 5, inserted with the 5 stamens on a disk crowning the ovary. Styles 2, sometimes united and dilated at base (*stylopodium*). Fruit dry, separating from each other, and often from a slender axis (*carpophore*), into two indehiscent carpels (*mericarps*), adhering by their faces (*commissures*). They are marked by a definite number of ribs (*juga*), which are sometimes produced into wings; the intervening spaces (*intervals*), as well as the commissure, sometimes contain canals or receptacles of volatile oil called *vittæ*.

This very extensive and difficult order is composed of herbs with hollow stems, and mostly with alternate and much-divided leaves, with the petioles sheathing or dilated at base. The flowers are in simple or mostly compound umbels, sometimes contracted into a kind of head. They are found in all parts of the world, but are most abundant in the northern hemisphere. In tropical regions they are confined to the sea-side or to the mountains. They are all furnished with a volatile oil or balsam, most plentiful in the root and seeds; some again furnish gum-resins, and a few are pervaded in every part with an alkaloid, acro-narcotic principle. Many species are used as articles of food, and still more are medicinal.

Without attempting a detailed enumeration of the real or asserted properties of the numerous species used as food or medicine, the following brief notice will explain the general properties of the most important of them.

Among the poisonous species, *Conium* is the most striking for its acro-narcotic powers. A violent poison also exists in the roots of *Cicuta maculata;* the *C. virosa* is also very active, causing tetanic convulsions. Haller is of opinion that it was the *Conium* of the Greeks. The leaves of *Æthusa cynapium* are also noxious, as are the roots of *Œnanthe crocata.* Many also of the cultivated species, as Celery and Parsnip, are injurious in their wild state. The roots of *Lichtensteina pyrethrifolia* are used by the Hottentots to prepare an intoxicating drink.

The most generally employed of those with aromatic and carminative seeds are Anise, Caraway, Coriander, and Cummin. Of those which afford gum-resins, the most important are the *Ferulas* yielding Asafœtida. Galbanum is said to be produced by the *Opoidia galbanifera*, but is also furnished by other plants. *Opoponax chironum* yields Opoponax. *Gum ammoniacum* is partly derived from a *Dorema*, and partly from a species of *Ferula*, and it is thought that Sagapenum is also obtained from another species of the same genus.

Numerous plants of this order are employed for food, as Parsnips, Carrots, Celery, Parsley, Samphire, &c., besides many others of less note.

Orthospermæ.

Section 1. *Saniculeæ.*—Fruit ovate-globose. Vittæ often wanting.

Eryngium.—*Linn.*

Flowers sessile. Calyx-tube with scale-like vesicles, lobes somewhat leafy. Petals connivent, oblong, with a long inflexed point. Styles filiform. Fruit obovate, nearly terete, squamate or tuberculate. Carpels semi-terete, without vittæ or ribs. Carpophore adnate with the carpels.

The genus Eryngium consists of herbaceous or suffruticose plants, with

leaves that are often prickly. The flowers are usually blue or white, and bracteated, the lower bracts being involucrate, the others intermixed with the flowers in the form of scales. There are nine or ten species found in the United States, some of which are medicinal, as are also some of those peculiar to Europe.

E. MARITIMUM, *Linn.*—Radical leaves roundish, plaited, spinous. Scales of the receptacle 3-cleft.

Linn., *Sp. Pl.* 337; Woodville, i. 120; Stephenson and Churchill, iii. 143.

Common Names.—Eryngo; Sea Holly.

Foreign Names.—Panicaut maritime, *Fr.;* Eringio marino, *It.;* Meerstrandmanstreu, *Ger.*

Description.—Root creeping, horizontal, cylindrical, about as thick as a finger, very long. Stem about a foot high, round, branched, striated, leafy. Radical leaves roundish or reniform, petiolated, plaited, 3-lobed; those of the stem sessile, the whole smooth, of a glaucous colour, and armed with sharp spines, like those of the holly. The flowers are disposed at the ends of the stem and branches, in dense, conical heads. They are small, numerous, of a bright-blue colour, and separated by small, rigid scales, and surrounded at base by a pinnatifid, spinous involucrum. The scales are 3-toothed. The calyx is superior, consisting of five erect, equal sepals. The corolla has five, equal, oblong petals, with their points inflexed. The stamens are five, longer than the corolla, with oblong anthers. The ovary is ovate-oblong, hispid, crowned with two filiform styles, bearing simple stigmas. The fruit is bristly, separable into two parts, and consisting of a like number of oblong, nearly cylindrical seeds.

The Sea Holly is found in most of the maritime parts of Europe, on sandy beaches, flowering in July and August. It was well known to the ancients, and is spoken of by Dioscorides as an antilithic, and became very celebrated, till within the last century, for the numerous virtues it was supposed to possess. Not to speak of earlier writers, Boerhaave quotes it as the first of the aperient diuretic roots; and it was much used by his contemporaries in gonorrhœa and visceral obstructions, particularly of the gall-bladder and kidneys. But the most eminent of the powers attributed to it, were those of provoking the menstrual discharge, for which it was considered as a specific that scarcely ever failed; nor was it less celebrated as a febrifuge in paroxysmal fevers. Baglivi speaks of it in high terms in affections of the bladder. At a later period it was much praised by Drs. Hoffmann and Guthe, of Manheim, in phthisis. In fact, no article of the Materia Medica was at one time in greater repute than this, nor any one that has more completely been forgotten. It must be possessed of some active powers, to have so long maintained its reputation, and the subsequent neglect of it can only be attributed to one of those caprices, unfortunately too common with regard to remedial articles, scarcely one of which has not been successively lauded to the skies, to be laid aside and forgotten, in a few years to be again restored to favour.

Among its other virtues, it was much esteemed for its aphrodisiac qualities, which appear to have been noticed at a very early period, and are constantly alluded to by the dramatists and poets of the Elizabethian and succeeding ages. Shakspeare frequently notices it, as does Prior in one of his tales. The root was prepared candied, at Colchester, in England, and sold in considerable quantities, as we are told by Sir J. E. Smith (*Eng. Bot.*) The part used in medicine is also the root; this has a sweet, agreeable taste and aromatic smell; it gives out its properties to water.

The *E. campestre*, also a native of Europe, is possessed of the same qualities, and is employed in the same way. A native species, the *E. aquaticum*, which occurs in low, wet places, from Virginia to Florida, has been used with some success as a diaphoretic and expectorant. In large doses it

proves emetic. The root, which is the part that is officinal, is pungent, bitter, and aromatic.

Section 2. *Ammineæ.*—Fruit with primary ribs only, compressed laterally or didymous.

Cicuta.—*Linn.*

Margin of calyx 5-toothed, teeth somewhat foliaceous. Petals obcordate, point inflexed. Fruit roundish, contracted laterally, didymous. Carpels with 5 flattish, equal ribs, lateral ones marginal; intervals filled with single vittæ. Commissure with 2 vittæ. Carpophore 2-parted. Seed terete.

This genus is small, and consists of perennial, aquatic, glabrous herbs, with terete, fistulous stems and tri-pinnately or tri-ternately-divided leaves. The involucrum is wanting, or is few-leaved. The involucels are many-leaved. The flowers are white in all the species. They are extremely poisonous, and are known under the common name of Hemlock.

C. maculata, *Linn.*—Root fasciculate. Stem streaked with purple. Leaves biternately divided. Follicles lanceolate, mucronately serrate. Umbels terminal and axillary.

Linn., *Sp. Pl.* 367; Torrey and Gray, *Fl.* i. 610; Bigelow, *Med. Bot.* i. t. 12; Rafinesque, *Med. Flor.* i. 107.

Common Names.—Water Hemlock, Spotted Cowbane, Beaver Poison, &c.

Fig. 154.

C. maculata.

Description.—Root perennial, composed of several oblong, fleshy tubers, about the size of the finger. Stem from 3 to 8 feet high, hollow, jointed, striated with green and purple, or spotted, sometimes entirely green. The lower leaves are on long petioles, the terminal division quinate or pinnate, the segments more or less lanceolate; upper leaves usually ternate, all of them petiolate, with the primary veins running to the notches, and not to the points of the serratures. Flowers white, in terminal or axillary umbels, without involucres, rays of the umbels long and slender. Involucels of five or six short linear leaves. Calyx connected with the ovary, 5-toothed at margin. The petals are five, obovate, white, entire, with the point inflexed. The stamens are longer than the petals, with ovate anthers. The styles are two, short and recurved.

The fruit is nearly globular, aromatic. The mericarps are flat inside, convex on the other, with five ribs, which are broad, and filled with a white cellular substance.

The Water Hemlock is found in all parts of the United States, growing in wet places, and flowering in July and August. It is well known as one of the most poisonous plants indigenous to the country, and has occasioned the death of many children, from their having eaten the root, in mistake for that of the Sweet Cicely.— When taken in any quantity it causes all the symptoms of the acro-narcotics. The whole plant, in a fresh state, is poisonous; but by drying, the stem and leaves become innocuous, and are eaten by cattle without danger. The root, however, is the most active portion; it has a strong aromatic taste and odour, and the cortical portion contains a yellowish, viscid juice.

Fig. 155.

C. virosa.
1. A flower. 2. Fruit.

Medical Properties.— It is a powerful narcotic, somewhat resembling the *Conium* in its action, seldom employed in practice, but has been given as a sedative, to alleviate the pain in scirrhus and cancer. Dr. Bigelow says that it is identical with the *C. virosa* in its properties; and it may be mentioned that the *C. maculata* has been figured for that species by Bulliard (*Plantes de France*), and by Roques (*Phytographie Medicale*), as well as in the *Flore Medicale*.

The *C. virosa*, which is common to Europe, is also found in Canada, and is equally poisonous with the above. Haller considered it the Conium of the Greeks.

Petroselinum.—*Hoffmann.*

Calyx with the limb obsolete. Petals rounded, incurved, scarcely emarginate, with the apex narrow and inflexed. Fruit ovate, compressed at the sides. Mericarps with 5 equal ribs, the lateral ones marginal. Channels with single vittæ; commissure with 2 vittæ. Axis bipartite. Involucre few-leaved; involucels many-leaved.

A small genus separated by Hoffmann from *Apium*, with which, however, it is closely allied.

P. SATIVUM, *Hoffmann.*—Leaves decompound; segments of lower ones cuneate-ovate, trifid and incised dentate, of the upper, linear-lanceolate, nearly entire; involucels subulate.

Hoffmann, *Umb.* 1, t. 1, f. 2; De Candolle, *Prod.*, iv. 102; Darlington, *Fl. Cest.*, 188; *Apium petroselinum*, Linn., *Sp. Pl.* 379.

Common Name.—Parsley.

Foreign Names.—Persil, *Fr.*; Die petersilie, *Ger.*

Description.—Root fusiform, fleshy, biennial. Stem 2—4 feet high, somewhat angular, striate with green and yellow lines, branching, smooth. Leaves of a bright green, smooth; the lower much dissected, terminal segments 3-parted; upper mostly 3-parted, with narrow segments. Umbels terminal and axillary, pedunculate. Involucre often of a single leaf, sometimes 2—3, linear or subulate. Involucels of 5—6 short subulate leaves. Petals greenish-white. Fruit ovate; styles short and recurved.

This plant is a native of the countries bordering on the Mediterranean, and is now generally cultivated in gardens. It flowers in June, and ripens its fruit in August. A variety is often met with, having the lower leaves broader and much curled at the edges. The whole herb possesses a peculiar aromatic odour. It is cultivated principally for the sake of its leaves, which are used for a variety of culinary purposes. The parts used in medicine are the root, seeds and leaves. They all owe their properties to the presence of a volatile oil.

Medical Uses, &c.—The root has some celebrity as a diuretic, but is seldom employed in regular practice. Dr. Chapman, however, speaks of it in high terms in the treatment of dropsies (*Elem. Therap., &c.* i. 276); and it has also been advantageous in suppression of urine, especially in children, and in strangury. The best mode of administering it is in strong infusion. The seeds have been employed as carminatives, and for the same purposes as the root. It is asserted by Richter that, when powdered and sprinkled on the hair, or applied in the form of an ointment, they will effectually destroy vermin. (*Am. Cyclop. Prac. Med.*, ii. 199.) The leaves and whole herb have been used in a variety of diseases. Tissot says that they will cure the bites or stings of insects, and they are much employed to relieve the pain and swelling of contusions. They have also been considered efficacious in swelled breasts and enlarged glands. (*Nouv. Jour. de Med.*, v. 209.) Rochefort states that they are useful in small-pox (*Mat. Med.*, i. 446.) One of the most extraordinary properties attributed to this herb is, that it will cause the fracture of glass vessels by being rubbed on them; this is gravely asserted by Lemery, who says it is owing to a penetrating salt contained in the plant, corroding the glass. The volatile oil is usually obtained by distillation from the seeds; it is of a pale yellow colour, has the odour and taste of the plant, and deposits a white camphoraceous substance by standing. It may be used in all cases in which the seeds are employed, but is seldom prescribed. Burnett says that the seeds are a deadly poison to parrots.

CARUM.—*Linn.*

Margin of calyx obsolete. Petals obovate, emarginate, inflexed. Stylopodium depressed. Fruit contracted on the side, ovate or oblong. Mericarps with five equal equidistant ribs; intervals with a single vitta. Commissure flat, vittate. Carpophore free, bifid at apex.

A small genus of smooth, and often perennial herbs, with tuberous edible

roots. The leaves are pinnatisect, the segments many-cleft. Involucre variable, and flowers white.

C. CARUI, *Linn.*—Root fusiform. Stem branched. Involucre none. Leaves bipinnatisect.

Linn., *Sp. Pl.* 378; Woodville, i. 102; Stephenson and Churchill, i. 59; Lindley, *Fl. Med.* 37.

Common Names.—Caraway; Caroy.

Foreign Names.—Carvi, *Fr.*; Comino tedesco, *It.*; Kummelsamen, *Ger.*

Description.—Root fusiform. Stem erect, branched, furrowed, about two feet high. Lower leaves of a bright-green colour, petiolate, smooth, bipinnate, with numerous finely-cut leaflets, the segments of which are narrow, linear, and pointed; those of the stem are smaller, opposite, one of them with a dilated petiole, the other sessile. The flowers are numerous, of a pale flesh-colour, in a terminal umbel, which is generally without an involucre, but sometimes is furnished with 1—3 involucral leaves. The calyx is very small. The petals are five, small and inflexed; the stamens are about as long as the petals, and bear small, roundish two-lobed anthers. The ovary is ovate, and supports styles which are at first very short, but become elongated. The mericarps are elliptic-ovate, of a grayish-brown colour, and are marked with single vittæ.

The Caraway is a native of most parts of Europe, where, as well as in this country, it is also cultivated. It was known to the ancients, and is spoken of by Dioscorides and Pliny. The parts used are the seeds, well known under the name of caraway seeds. These, as found in the shops, are of a brownish colour, with five lighter-coloured primary ridges, and with a vitta in each interval; they are curved inwards. The taste is aromatic and warm, and the odour fragrant but peculiar. They have not been analyzed, but the aromatic properties are owing to a volatile oil which is officinal. This oil is at first colourless, but becomes dark by keeping. It has the aroma of the seed, and a hot acrid taste.

Medical Properties.—Caraway is very little used in medicine. An infusion of the seeds is sometimes given to relieve the flatulent colic of children, and the oil and distilled water are employed as correctives to the nauseating and griping qualities of some medicines, and also like the infusion to relieve flatulence. The seeds are, however, much used by the confectioner, cook, and distiller. In Germany they are frequently added to bread, and also enter into the composition of a certain kind of cheese. In former times, the roots were used as a vegetable instead of parsnips, and Parkinson says that they are superior in flavour to that root.

PIMPINELLA.—*Linn.*

Margin of calyx obsolete. Petals obcordate, inflexed. Fruit ovate-oblong, crowned by a disk and the persistent styles. Mericarps with five filiform, equal ridges. Intervals trivittate. Carpophore bifid, free. Seed convex, anteriorly flattish.

This, like the other, is a small genus peculiar to the Old Continent; it consists of plants with simple, fusiform roots, and pinnatisect lower leaves; the segments are roundish-toothed, rarely undivided; those of the stem are much more finely cut. The umbels consist of many rays. The involucre is wanting. The flowers are white, but sometimes pink or yellow.

P. ANISUM, *Linn.*—Stem smooth. Radical leaves cordate, 3-lobed; middle ones pinnate, round; upper ones trifid, undivided, linear.

Linn., *Sp. Pl.* 379; Woodville, i. 135; Stokes, ii. 140; Stephenson and Churchill, iii. 156; Lindley, *Fl. Med.* 38.

Common Name.—Anise.

Foreign Names.—L'anise, *Fr.*; Anice, *It.*; Anis, *Ger.*; Annison, *Arab.*

Description.—Root fusiform, woody. Stem erect, branched, solid, round, jointed, striated, somewhat rough or downy, and about a foot high. The lower leaves are roundish, somewhat three to five-lobed, unequally-toothed, and supported on furrowed, sheath-like petioles; those on the upper part of the stem are divided into narrow, pinnated, acute segments. The flowers are small and white, in flat, terminal umbels, without any involucre. The calyx is very minute, or wanting. The corolla consists of five nearly equal, obcordate petals, incurved at tip. The stamens are five, filiform, longer than the petals, with roundish anthers. The ovary is ovate, downy, with slender styles bearing obtuse stigmas. The fruit is ovate; the mericarps with five rather prominent ribs, the intervals being rugose.

The Anise is a perennial, and was originally a native of Egypt, but is now extensively cultivated in many parts of Europe, especially in Spain, Malta, and Germany. The seeds are the officinal portion. These are slightly compressed, ovate, of a grayish-green colour, with five paler, narrow ridges, and somewhat downy. Their odour is aromatic, and their taste grateful and sweetish. They are principally imported from the Mediterranean, and from some of the German ports; but the first are preferred. They owe their properties to a volatile oil, which is officinal; but is almost superseded by the oil of the *Illicium anisatum*, which resembles it in almost every particular.

Medical Properties.—Anise is an aromatic stimulant, and is used both in the form of infusion and in the oil in colic, dyspepsia, and to prevent the griping effects of some purgatives. The principal employment of it is by the confectioner and distiller. Hoffmann strongly recommends these seeds in weakness of the stomach and bowels, and says that they fully deserve the appellation bestowed upon them by Van Helmont, of *intestinorum solamen*. It is said that the milk of women, who have taken the oil, is impregnated with its odour, which may account for an idea formerly entertained, that this oil promoted the secretion of that fluid. Vogel states a curious fact with regard to it, that a few drops will destroy a pigeon, and this has been noticed by other writers. The smell is peculiarly inviting to rats, and forms one of the flavouring ingredients in the pastes, &c. used to destroy these animals. Anise is the basis also of a very common liqueur, known under the name of Aniseed Cordial, or *Crême d'anise*.

The root of *P. saxifraga* is astringent; and, according to Burnett, is employed as a masticatory in toothache, and, in decoction, to remove freckles. Two other European species, *P. magna*, and *P. dissecta*, have similar properties.

Section 3. Seselineæ.—Fruit with primary ribs only; the transverse section orbicular.

Fæniculum.—*Gærtner.*

Margin of calyx tumid, toothless. Petals roundish, entire, involute. Mericarps with five prominent, blunt ridges, the lateral ones broader and marginal. Intervals univittate. Commissure bivittate. Seed nearly semi-terete.

A genus of herbaceous plants, which was formerly included in *Anethum*, but was separated by Gærtner on account of the difference of the seed. They are biennial and perennial, with tapering, somewhat striated stems, and pinnatifid, decompound leaves, having setaceous, linear segments; the involucre is almost wanting; the flowers are yellow. Some confusion exists with

regard to the species, or at least the officinal ones. The Edinburgh Pharmacopœia includes these under the name of *F. officinale;* whilst Pereira, in accordance with De Candolle, admits two species, the *F. vulgare* and *dulce;* and the London College quotes the *F. vulgare* as the officinal plant. To add to the confusion, Merat and De Lens give three species, the *F. vulgare*, *officinale*, and *dulce*. As these appear to be mere varieties of each other, they will be considered under the same head.

F. OFFICINALE, *Allioni.*—Stem terete at base. Leaves tripinnate; leaflets subulate, drooping.

Linn., (*Anethum,*) *Sp. Pl.* 377; Woodville, t. 49; *F. vulgare*, Stephenson and Churchill, iii. 137; Lindley, *Fl. Med.* 41.

Common Names.—Fennel; Sweet Fennel; Italian Fennel.

Foreign Names.—Fenouil, *Fr.;* Finocchio, *It.;* Fenchel, *Ger.*

Description.—The root is fusiform and whitish. The stem is striated, solid, jointed, shining, of a deep glaucous-green colour. The leaves are alternate, tripinnate, composed of long, capillary, acute, drooping leaflets, and supported on petioles with a broad, membranous, sheathing base. The flowers are in broad, flat, yellow, terminal umbels. The petals are obovate, with their points inflexed; the stamens are shorter than the petals, incurved, yellow, with roundish anthers. The styles are short, and the seeds oblong, very little compressed, five-ribbed, and of a brownish-olive colour.

The Fennel is a native of the South of Europe, but has become naturalized in other parts, and is cultivated in gardens both there and in this country. The officinal part is the seeds, of which three kinds are found in commerce: 1, ovoid, glabrous, of a dull green, marked with lines, of which two are more prominent than the others; these are the product of the *F. vulgare*, and are seldom used; 2d, long, somewhat curved, of a brighter green, pedicel often adhering to them, they are very aromatic; these are the product of the *F. officinale;* 3d, much broader and ovoid, ribs strongly marked; these are produced by the *F. dulce*, and form probably what Dr. Pereira terms *shorts*, whilst No. 2 furnishes what he designates as *longs*. The variety *dulce* is annual; but, as the plant is only known in a cultivated state, this variation, and its less aromatic but greater sweetness of taste may be safely attributed to this cause, and not to any specific difference in the plants. The seeds owe their properties to the presence of a volatile oil.

Medical Properties.—Fennel seeds are carminative and stimulant, and are used in infusion in the flatulent colic of children; and the distilled water and oil, like those of the anise and caraway, as vehicles for, or to correct the action of other remedies. The leaves of the common fennel are used in cookery, in sauces, and for garnishing dishes. The stalks of the sweet kind are much used in Italy and Sicily as a culinary vegetable, under the name of *Finocchio dolce.*

The *F. panmorium*, of India, has a fruit exactly resembling the Fennel seeds of commerce, and with the same odour and taste. It is employed in its native country as a warm aromatic and carminative in flatulent colic and dyspepsia.

Section 4. ANGELICEÆ.—Fruit with primary ribs only. Margin of carpels dilated into a double wing.

ARCHANGELICA.—*Hoffmann.*

Calyx teeth short. Petals elliptical, entire, acuminate, with the point incurved. Fruit somewhat compressed at the back. Carpels with three rather thick, carinated, dorsal ribs; lateral ribs dilated into marginal wings. Vittæ numerous, surrounding the seed.

This genus was separated by Hoffmann from *Angelica* of Linnæus, on account of many important differences; for though the general aspect of the species of the two genera is very similar, they differ in almost all their details. They are perennial; the leaves are 3-parted, with the divisions pinnately or bipinnately divided, the segments being ovate, toothed or serrate, and are supported on large, inflated petioles. The involucre is almost wanting, but the involucels are many-leaved. The flowers are greenish or white.

A. OFFICINALIS, *Hoffmann.*—Stem glabrous, terete, striate; leaves bipinnately divided; segments subcordate, lobed, acutely serrate, the terminal one 3-lobed; involucel as long as the umbellets.

Hoffmann, *Umb.* 166; Koch., *Umb.* 98, f. 17; Torrey and Gray, *Fl.* i. 621; Stephenson and Churchill, ii. 83; Lindley, *Fl. Med.* 43; *Angelica archangelica*; Linn., *Sp. Pl.* 360; *Eng. Bot.* 2561.

Common Names.—Angelica; Garden angelica, &c.

Foreign Names.—Angelique, *Fr.*; Angelica domestica, *It.*; Angelika, *Ger.*

Description.—Root large, branched, resinous. Stem four to five feet high, jointed, round, hollow, striated, smooth, of a purplish colour below, much branched. The leaves are numerous, large, petiolated, smooth, and pinnated, with the leaflets ovate-lanceolate, pointed, acutely serrated, smooth, and having the terminal ones three-lobed; the petioles are membranous at base, tumid, with many ribs, and much dilated. The involucres are almost wanting; the involucels consist of eight linear, lanceolate leaves. The flowers are numerous, of a greenish-white colour, and grow in large, terminal umbels. The calyx has a small, short, five-toothed margin; the corolla is small, and composed of five unequal, elliptic, lanceolate petals, with their points inflexed; the stamens are longer than the petals, with roundish anthers. The ovary is furrowed, ovate, and supports two very short, erect styles with obtuse stigmas. The fruit is dorsally compressed; the mericarps are flat on one side, and convex on the other, with four acute ribs, emarginate on both ends, and winged at the sides.

Angelica is a native of many parts of Europe, and has been found in the most northern parts of this continent. It is frequently met with in gardens. The best is said to come from Spain and Bohemia, but Linnæus states that it is most vigorous and aromatic to the north. The parts used are the root and stalks; the first has a fragrant, agreeable odour, and a bitterish, pungent taste on being chewed; they are at first sweetish, afterwards acrid, and leave a sensation of heat in the mouth and fauces, which continues for some time. The stalks have the same qualities, but in a lesser degree. The root has been analyzed, and found to contain bitter extractive, gum, an acrid, soft resin, a little volatile oil, &c.

Medical Properties.—Angelica is an aromatic stimulant and gentle tonic, but is very seldom used as a therapeutic agent, its principal employment being as a sweetmeat, for which purpose the root and stalks are candied. In Lapland, however, it is held in high esteem in a variety of complaints, especially in those of the lungs and bowels. At one time it was in much repute as an antidote against poisons and malignant disorders. Gerarde says of it: "The roote of Garden Angelica is a singular remedie against poison, and against plague, and all infections taken by evil and corrupt air, if you do but take a peece of the roote and hold in your mouthe, or chew the same between your teeth, it doth most certainly drive away the pestilentiall aire. It is a most singular medicine against surfeiting and lothsomnes to meate; it helpeth concoction in the stomacke and is right beneficial to the harte; it cureth the bitings of mad dogs, and all venomous beasts." (*Herball*, 849.)

A native species, the *A. atro-purpurea*, is very similar in its properties to the above, and when dried, is used in flatulent colic and cardialgia. In a re-

cent state the root is acrid, and is said to be poisonous. The stems are candied as a sweetmeat in some parts of the country; by cultivation, it is probable that this plant would become fully equal to the garden kind.

The root of the *Angelica lucida* is fully as aromatic as the above, and was highly valued by the Southern Indians, both as a remedy and as a condiment, and it deserves notice in a horticultural point of view, for if the accounts given of it be true, it would be an acquisition to our culinary vegetables.

Section 5. PEUCEDANEÆ.—Fruit with primary wings only. Margin of carpels dilated into a single wing.

OPOPONAX.—*Koch.*

Margin of calyx obsolete. Petals roundish, entire, involute. Stylopodium broad, thick. Styles very short. Fruit elliptical, compressed, with a dilated margin. Mericarps with three dorsal, thin, prominent ridges, and no distinct lateral ones. Vittæ three in each interval; 6—10 to each commissure.

This genus, which approaches very closely to *Pastinaca*, formerly was included in it, but was separated by Koch (*Umbell.*), in consequence of the differences presented by the seed. There is but a single species.

O. CHIRONUM, *Koch.*—Leaves bipinnate; leaflets unequal at base, scabrous on both sides.

Linn., (*Pastinaca*), *Sp. Pl.* 376; Woodville, i. 111; Stephenson and Churchill, ii. 98.

Common Names.—Opoponax; Rough parsnip.

Foreign Names.—Panais opoponax, *Fr.;* Herba costa, *It.*

Description.—Root perennial, very large, fleshy, of a yellow colour, covered with a cork-like bark. The stem is seven or eight feet in height, thick, round, striated, and rough at base, with numerous angular, smooth, shining, hairy branches near the top. The leaves are large, rough on both sides, more or less hairy, acutely serrated; the cauline leaves are pinnate, composed of oblong, serrated leaflets, the terminal one cordate, large; the petioles are sheathing; the radical leaves are simple, cordate, and crenated. The involucres and involucels consist of four to six very small linear leaflets, but are sometimes wanting. The flowers are small, numerous, of a greenish-yellow colour, in terminal, flat umbels. They are all uniform, and generally fertile. The limb of the calyx is very small; the petals are involute, entire, equal; the stamens filiform, with roundish anthers; the ovary is roundish, with short, erect styles. The fruit is elliptical, roundish, compressed, striated, with three dorsal ribs, and two indistinct lateral ones, forming a thin border.

The Opoponax is a native of the countries bordering on the Mediterranean, but it is only in the warmer parts that it affords its peculiar product; this is a gum-resin, obtained by wounding the roots of the plant. At first it is in the form of a milky juice, which gradually concretes into tears or masses, and is known under the name of Opoponax. As found in commerce, it is in irregular reddish-yellow lumps or tears, of an unpleasant smell, and acrid, bitter taste. When rubbed with water, it forms an emulsion. It consists of about forty per cent. of resin, and thirty per cent. of gum, and a small portion of volatile oil, to which latter it owes its smell.

Medical Properties.—It was known to Hippocrates, and four kinds of it are described by Theophrastus, and three by Dioscorides. It was much esteemed by the ancients, and according to Celsus, was highly beneficial in diseases of the spleen and scrofula. At a later period, it was considered useful in paralysis, cerebral affections, &c., and on the continent of Europe, still holds a rank as a discutient, carminative, and resolvent, but is seldom or

never employed in England or this country. It, however, possesses much the same properties as galbanum, and might be used wherever that article is indicated.

Ferula.—*Linn.*

Margin of calyx with 5 short teeth. Petals ovate, entire, acuminate, with an incurved point. Fruit flattened at the base, with a dilated flat border. Mericarps with three dorsal filiform ridges, the two lateral, obsolete and lost in the dilated margin. Vittæ in the dorsal channels 3 or more, in the commissure, 4 or more. Seeds flat. Carpophore bipartite.

A genus of herbaceous plants having smooth stems and much-divided leaves, principally natives of the warm parts of Europe, Asia, and Africa, and mostly furnishing a gum-resin of a strong and unpleasant smell. The stalks abound in pith, which forms an excellent tinder, and the dried stalks were formerly used by school-masters, whence the term *ferule*. The roots are fleshy, and the flowers yellow. Several species of this genus have been thought to afford the fetid gums, as Assafœtida, Sagapenum, Ammoniacum, and Galbanum, but recent observations are by no means confirmatory of this, and although the subject is still in a most unsatisfactory state, it now appears clear that the best qualities of these drugs are derived from plants of other, though closely allied genera. Most of the species, however, yield products of an analogous nature, and no doubt are the origin of some of the varieties of these gums as found in commerce.

1. F. persica, *Willd.*—Root perennial. Radical leaves supra-decompound, ternate; with the segments decurrently pinnate, with linear-lanceolate lobes, which are dilated, cut, and ciliated at the end. Stem about two feet high, erect, taper, smooth, with concave membranous sheaths. Lower branches alternate, middle ones verticillate. Rays of the general umbel 20—30, of the partial 10—20. Involucres wanting. Fertile flowers sessile, sterile ones stalked.

Willdenow, *Sp. Pl.* i. 1413; De Candolle, *Prod.* iv. 173; Nees and Eberm. iii. 55; Stephenson and Churchill, iii. 169; Lindley, *Fl. Med.* 45; *Bot. Mag.* t. 2096; *F. sagapenum*, Fee, *Cours.* ii. 201.

This plant is a native of Persia, and is said by Willdenow, Sprengel, and Fee, to yield Sagapenum, whilst Olivier asserts that it produces Ammoniacum, and Hope (*Philos. Trans.* lxxv. 36) considers it as affording Assafœtida; this latter supposition seems to be the most correct, and is admitted by the Edinburgh College, which recognises it as the origin of the drug. Michaux sent its seeds from Persia as those of the plant yielding it, and Stephenson and Churchill observe, that this species does furnish assafœtida "seems confirmed by the strong smell of that drug which pervades the whole herb, and Dr. Sims informs us that he has collected small globules of true assafœtida that had exuded from the stem." Nees and Ebermaier are likewise of opinion that this is one of the sources from whence the drug in question is procured. It would seem, therefore, that some of the assafœtida of commerce is derived from this Ferula, though the most of it may be afforded by another plant. (See Narthex.)

The gum-resin called Sagapenum is principally imported from the Levant. It is in masses, formed of soft, cohering fragments, somewhat translucent, of a brownish-yellow or reddish-yellow colour externally, but paler within, of a waxy consistence, an alliaceous odour, but less disagreeable than that of assafœtida, and a warm, bitterish, unpleasant taste. According to Brandes (Gmelin, *Handb.* ii. 625), it consists of Resin 50·29; Gum, 32·72; Bassorin, 4·48; Volatile oil, 3·73, &c. These results are very analogous to

those obtained by Pelletier (*Bull. de Pharm.* iii. 481). Its action and uses are much the same as those of Assafœtida, and it is considered to partake of the qualities of that article and Galbanum. It is now seldom used, but at one time was in much repute as a resolvent in indolent tumours; it has also been recommended as an emmenagogue and antispasmodic. It was very early used in medicine, being noticed by Hippocrates and Dioscorides, the latter of whom states that it is the product of a species of *Ferula*.

2. F. ORIENTALIS, *Linn.*—Root large. Stem about 3 feet high, 1½ inch thick, of a purplish colour. Lower leaves large, tomentose, 5—6 times pinnated, the principal divisions naked at base; of a bright green, setaceous; the upper leaves smaller, with a very large inflated, sheathing petiole. Involucres subulate. Flowers yellow. Fruit oblong or elliptical, brownish, bitter, oily.

Linn., *Sp. Pl.* 356; De Candolle, *Prod.* iv. 173; Tournf., *Voyage*, ii. 154; Lindley, *Fl. Med.* 46; *F. ammonifera*, Lemery, *Dict. des drog.* 37; Fee, *Cours.* ii. 198.

This species is a native of Asia Minor, Greece, and perhaps of Morocco, and was at one time supposed to be the *Fashook* stated by Jackson to afford the Ammoniacum of the Barbary coast, but recent observations by Dr. Lindley and others show that this is rather to be referred to the next species.

3. F. TINGITANA, *Linn.*—Stem tapering, branched. Leaves supra-decompound, shining; segments oblong-lanceolate, cut, toothed; the upper petioles large and sheathing. Umbel terminal, on a short stalk; lateral flowers few, male, on longer stalks. Involucre wanting.

Linn., *Sp. Pl.* 355; De Candolle, *Prod.* iv. 173; Viviani, *Fl. Lev.* 17; Lindley, *Fl. Med.* 47; *Fashook*, Jackson, *Morocc.* t. 7.

A native of Barbary, and said to be found about Cyrene, though this is denied by Viviani. This plant is most probably the *Agasyllis* of Dioscorides, and *Metopion* of Pliny, which is stated by the first to grow near Cyrene, and by the latter near the temple of Jupiter Ammon. Both these authors speak of two kinds of gum, one much superior to the other. Jackson in his account of Morocco says that the plant affording this gum-resin grows in that country, and is known under the name of *Fashook;* his description and figure were until lately supposed to refer to *F. orientalis*, but Drs. Lindley and Royle having obtained seeds from Morocco, marked as those of the *Furogh* or gum ammoniac plant, some of them were sent to Dr. Falconer of the Saharunpore Botanic Garden, who grew them and found the plants to be identical with *F. tingitana;* this fact had also been ascertained by Dr. Lindley from an inspection of the seeds themselves. There appears to be little doubt that this is the plant spoken of by the older writers as affording the gum ammoniac then in use, but the article now employed is exclusively a product of Asia, and is obtained from a wholly different genus. (See DOREMA.)

3. F. FERULAGO, *Linn.*—Stem terete, striated. Leaves supra-decompound, with pinnatifid, divaricating segments, and linear, cuspidate lobes. Involucre with numerous, oblong-lanceolate, reflexed leaflets. Rays of general umbel about 12, of the partial rather more. Fruit obovate; the three dorsal ridges thick and elevated, the lateral ones less distinct. Margins somewhat thickened. Vittæ indefinite in number on both sides, slender.

Linn., *Sp. Pl.* 356; De Candolle, *Prod.* iv. 171; Lindley, *Fl. Med.* 46; *F. nodiflora*, Jacq. *Aust. App.* t. 5; *F. galbanifera*, Nees and Eberm. iii. 49.

A native of the Mediterranean coasts, Transylvania, Caucasus, &c. It affords an abundant gum-resinous juice, and was considered by Lobel to be the source of Galbanum, as seeds which he found attached to the gum, on

being sown, produced this plant. In this he is followed by Nees and Ebermaier; but as the Galbanum of commerce is principally imported from India and the Levant, the ports of which it reaches by way of the Persian Gulf, it is almost certain that it has another origin. (See GALBANUM.) Pereira (ii. 490) describes the African gum as very like the Persian, except in odour.

In addition to the above, several other species of Ferula have been noticed as affording analogous products; thus the *F. hooshee* of Upper India yields a gum resembling Opoponax (Lindley, *Fl. Med.* 46); and the *F. glauca* of the Levant abounds in an acrid, lactescent juice, of a strong odour.

NARTHEX.—*Falconer.*

Margin of calyx obsolete. Petals? Stylopodium plicate-urceolate. Styles filiform, finally reflexed. Fruit plano-convex, with a dilated border. Mericarps with 5 primary ridges; the 3 intermediate ones filiform, the 2 lateral obsolete, immersed in the contiguous margin. Vittæ in the dorsal furrows usually single; in the commissures 4—6, unequal and variable. Seed flat. Carpophore bipartite.

This genus was established, by Dr. Falconer, on the *Ferula assafœtida*, Linn., from a careful investigation of wild specimens and cultivated plants. It certainly differs in many essential characters from Ferula, and appears to be distinct and well marked. The above characters and the ensuing description of the only species yet discovered of it, are extracted from Dr. Falconer's remarks, as published by Dr. Royle (*Mat. Med.* 407, *et seq.*)

N. ASSAFŒTIDA.—Stem simple, terete. Radical leaves fasciculated. Petioles trifurcate. Divisions bipinnatisect. Leaf segments linear-ligulate, obtuse, unequilateral, entire, sinuate, decurrent.

Ferula assafœtida, Linn., *Mat. Med.* 79; De Candolle, *Prod.* iv. 173; Lindley, *Flor. Med.* 45; *Assafœtida disgunensis*, Kæmpfer, *Amœn. Exot.* 535.

Fig. 156.

N. assafœtida.

Description.—Perennial. Root simple, or divided, fusiform, large, with a dark-grayish, transversely corrugated bark; the upper part above the soil, covered with dark, hair-like, fibrous processes, which are the persistent exuviæ of former years; cortical portion tough and thick, white or ash-coloured when cut, easily separable from the central part, and with it abounding in a milky, opaque, very fœtid, alliaceous juice. Stem erect, simple, terete, striate, solid, the spongy medulla traversed by bundles of tough, fibrous vessels; the surface invested with the remains of persistent leafless petioles. Leaves

fasciculate above the root, numerous, large, and spreading, of a light-green colour above, paler beneath, of a dry, leathery texture. Petioles terete, amplexicaul, and channelled at base, trifurcated a little above it, the divisions united at an angle with each other, as in a tripod, and bipinnatisect. Leaf-segments linear-ligulate, obtuse, entire or sinuately-lobed, either alternate or opposite, and usually inequilateral and decurrent, forming a narrow, winged channel on the petiole. Midrib prominent on the under side. Veins slender and much anastomosed. General and partial involucres wanting. Umbels 10—20-rayed, arising from the dilated spherical head of a common peduncle. Rays 2—4 inches long. Partial umbels with very short rays, collected in round capituli, having from 10—20 rays in the fertile, and from 25—30 in the sterile. Flowers small. Margin of calyx obsolete, being reduced to minute points. Petals of the sterile flowers small, oblique, inequilateral, acute, without an elongated apex. Stylopodia urceolate and plicated, with a sinuous margin. Styles filiform, reflected in the mature fruit, rather short, attached by a broad base. Fruit from 7—15, on short pedicels. Mericarps varying from broad elliptical to elliptic-obovate, 5—6 lines long by 3—4 broad, flat, thin, foliaceous, somewhat convex in the middle, with a dilated border, mostly inequilateral, of a dark reddish-brown at the centre, but lighter at the edges, smooth, and somewhat shining. Dorsal primary ribs 5; the 3 middle of which are filiform, a little crenated at their junction; 2 lateral ridges more obsolete, placed close to the margin, and immersed in the substance of the border, but distinctly marked on the surface of the commissure, and confluent with its middle nerve. Vittæ in the dorsal furrows large and broad, filling the whole width of the valleculæ, usually single, but sometimes double, in one or other of the middle furrows, and usually double or dichotomous in the broadest side of the margin. Vittæ of the commissure from 4—6, unequal and variable; one very slender vitta, frequently separating into two fine threads, confluent at the apex, being situated close to each side of the middle nerve; another, of the size of the dorsal vittæ, placed more outwardly, and a third at the inner side of the dilated border, over the edge of the seed, more slender, but often subdivided and interrupted so as to cover the border with a network of anastomosing ramifications. Seed flat, with a plain albumen. Carpophore bipartite, persistent, twice as long as the pedicels. Flowers white?

Fig. 157.

N. assafœtida.

9. Ovary; style and stylopodium enlarged. 10. Partial umbel, with fertile flowers. 11. Umbel of barren flowers. 12. Partial umbel in fruit, with persistent carpophores.

This plant is a native of many parts of Persia, and agrees in most respects with the *Assafœtida disgunensis* of Kæmpfer, described a century and a half since, but not met with by any botanist, until Dr. Falconer found it at Astore. This observer states that he compared his materials with Kæmpfer's figures and description, and with his original specimens in the Banksian collection in the British Museum, and found them very similar. The main differences are, that Kæmpfer says the umbellulæ have only 5—6 rays, whereas Dr. Falconer found them to consist of 22—30 in the sterile heads, and 10—20 in the

Fig. 158.

N. assafœtida.

1—4. Mericarps of natural size. *a* Dorsum. *b*. Commissure. 5. Mericarps in Kæmpfer's herbarium, dorsal aspect. 6. Transverse section of enlarged mericarp. 7. Seed, natural size. 8. Petals of barren flowers, enlarged.

fertile ones; this Dr. Falconer accounts for by the admission of Kæmpfer, that he never saw the plant in flower; and if the description was made from the ripe state of it, it is perfectly applicable, as the partial umbels at times, sometimes have only seven fruit-bearing stalks. Another discrepancy is, that Kæmpfer states that the leaves appear in the autumn, and vegetate during the winter, whilst Dr. Falconer says that in his Astore plant, they make their appearance in the spring. The differences presented by the mericarps are dwelt on at some length by Dr. Falconer (*Royle*, 409), but he admits that the only two of Kæmpfer's species preserved in the herbarium, are so damaged, that their vittæ cannot be distinctly made out, and do not agree with the description of them, which is "quadratenus pilosum sive asperum," whereas they are perfectly smooth. It may therefore be fairly assumed that these plants are identical, the differences between them being such only as might arise from locality, age of specimens, &c.

The concurrent evidence of Kæmpfer, Sir Alex. Burnes, M. Bellangé, Dr. Falconer, and others, prove that this is the plant which furnishes much of the Assafœtida of commerce, all of which is originally derived from the countries of which it is a native. At the same time it is not certain that it is the sole origin of that drug. As heretofore stated, seeds of *Ferula persica* were sent to Europe by Michaux, as those of the plant from which it was obtained. Dr. Falconer also states that he examined the fruit of another umbelliferous plant in the collection of Dr. Royle, labelled as the seed of the wild assafœtida plant, sent by Sir J. Macneil, from Persia, and found that it differed widely both from that of Narthex and Ferula, and belonged to another tribe of the order.

Assafœtida was early known and used in the East, but it is very uncertain when it became known to the Greeks and Romans. Sprengel says that the first notice of it was by Aristæus, about 617, B. C. It appears that a fetid gum was known and esteemed by these nations, which was called by the first οπος κυρηναϊκὸς, or Cyrenaic juice, and by the Romans *Laser*. This was supposed to be the product of a plant called *Silphion*, which grew about Cyrene, and which is represented on many of their coins, mirrors, &c. (See *Thapsia*.) In consequence of this gum becoming scarce, others of a similar character were substituted for it, and both Pliny and Dioscorides mention a kind of Laser that came from Persia and other Eastern countries. This, which was probably assafœtida, was not as much esteemed as the Cyrenian gum, but was in general use as a substitute for it. At a later period, Avicenna describes it under the name of *Hulteet*, and says there are two kinds,

one from Chiruana, which was of a pleasant smell, the other fetid, from Persia, which seems to be the present drug. The name is said to be derived from the Hebrew word *asa*, to heal, and *fœtida*, from its odour. Royle says that *assa* is probably of oriental origin, and is applied to other gum-resins.

Assafœtida is procured from incisions made into the upper portion of the root, or by taking successive slices from it. According to Kæmpfer, the process of collecting is divided into four parts; the first of which in April consists of clearing away the earth from the root of the plant, and removing the lower leaves and fibres, which are then laid over the root to protect it from the sun; in May the top of the root is transversely divided, and the covering of leaves replaced; two or three days afterwards, the exuded juice is scraped off and put in cups; these processes are repeated until the root is exhausted. Another collection being made in June, and a final one in July. The product is exposed to the sun to harden, after which it is packed for exportation.

Assafœtida as found in the shops, is in masses of different sizes and consistence. It is sometimes somewhat soft and adhesive, and at others quite hard and brittle. It is not readily pulverised, except at a low temperature, as it softens under the pestle. On being broken it presents a waxy lustre. It is very various in colour, but is usually whitish, intermixed with darker parts. On exposure to the air it becomes reddish, and finally brown. Its taste is unpleasant, bitter, and acrid. The odour is powerful, alliaceous, and even fetid, being peculiarly disagreeable to most persons, whence the Germans have expressively called it *Teufelsdreck*, or *Stercus diaboli*. On the other hand, among many Eastern nations, it is highly esteemed as a condiment, and Capt. Kinnier states, that in Persia the leaves of the plant are eaten as greens, and even the root, when roasted, (Ainslie, *Mat. Ind.* i. 21.) Sir Alex. Burnes also says, "In the fresh state it has the same abominable smell, and yet our fellow-travellers greedily devoured it." (*Travels*, ii. 243.) Kæmpfer, moreover, observes that it is much more powerful in the fresh than in the dried state, one drachm of the recent juice giving out a stronger smell than a hundred pounds of the concrete gum. But its use as a condiment is not confined to the Asiatics; it is also employed to flavour certain articles of food in Europe. Even when used as a medicine, persons often become so fond of it as to swallow it with absolute pleasure; this has been remarked in cases of children, who have taken it for some time as a palliative in hooping cough.

Assafœtida partakes of the usual characters of the gum-resins, but when exposed to heat never completely melts, though it softens and becomes adhesive. According to Brandes, it consists of Resin, 48·85; Gum, 19·40; Bassorin, 6·40; Volatile oil, 4·60, &c. Pelletier obtained more resin and volatile oil, and it is probable the proportions of the constituents vary in different specimens. The volatile oil is said to be most abundant in the fresh drug, and is the ingredient on which the offensive odour depends; the medical qualities also are mainly attributable to it, though some efficacy is undoubtedly owing to the bitter resin.

The effects of Assafœtida on the system, are stimulating, antispasmodic, expectorant, and emmenagogue. Its local effects are moderate, for although when internally administered in moderate doses, it produces a sensation o warmth, and an increased action of the heart and arteries, with some heat of skin, it is destitute of the irritating properties of many articles of its class. From the experiments of Jörg, it also appears to cause an increased peristaltic action of the bowels, and of the mucous secretions, with headache and giddiness, and a stimulation of the genito-urinary apparatus. Its influence on the nervous system is very marked, as is shown by its efficacy in so many morbid conditions. Dr. Pereira is of opinion that it has a special action on

the excito-motory nerves. Its volatile oil, or at least its odorous principle, is absorbed, as it is recognisable in the secretions, especially in the perspiration, which becomes fetid and alliaceous.

Medical Uses.—From what has been said of its properties, it is evident that, whilst its employment is improper in inflammatory conditions of the system, it is well suited to all cases of nervous derangement, unaccompanied with general or local excitement. Thus few remedies have been found more beneficial in hysteria than assafœtida, though its effects are rather to be regarded as palliative in the relief of the immediate paroxysm, than as absolutely curative of the disease. This remedy has also been found very useful in hypochondriacal affections, and even in chorea. In obstinate cases of singultus it has also proved highly beneficial. Much benefit has been derived from it as a stimulating expectorant and antispasmodic in various forms of chronic or spasmodic pectoral affections. In the chronic catarrh of elderly persons it often gives great relief, as it does also in some kinds of asthma; and the late Dr. Parrish found it of much service in infantile catarrhs, complicated with nervous irritation (*N. Am. Med. and Surg. Jour.*, i. 24). As a remedy in hooping-cough, after a removal of the primary inflammatory symptoms, it has attained much celebrity, but, like all other remedies in this disease, has been much overrated. Dr. Dewees says of it (*Practice*, 440), "our own experience is by no means calculated to advance the reputation of its powers; we have found it occasionally useful, but never of decided efficacy." Other eminent practitioners, however, speak more favourably of it.

In diseases of the abdominal viscera, assafœtida is often useful as a stimulating antispasmodic and laxative; thus in flatulent colic, especially in hysterical or dyspeptic persons, or in young children, it is very efficacious, and may be advantageously employed as an injection. It is also of service in combination with cathartics in costiveness attended with flatulence, particularly in the cases of elderly persons, or in those of a weak and relaxed condition of body. At one time this article was much used as an anthelmintic, but is now seldom employed, though it may still be resorted to with advantage, where there are signs of nervous disorder.

As an emmenagogue it has been highly praised, and no doubt has proved of benefit, when a stimulating action is required, or where the uterine disorder is combined with a disturbance of the nervous functions; but in cases of simple suppression or retention of the menses, it ought not to be relied upon. It should at the same time be stated that the experiments of Jörg tend to show that it has a specific influence on the genito-urinary apparatus. Assafœtida has likewise been considered as a resolvent of much power in chronic swellings, scrofulous tumours, &c., but does not appear to be superior to galbanum and other articles of the same class.

The dose of Assafœtida is from five to twenty grains, or even more. From its unpleasant taste and smell, it is usually given in pill. When the dose is large, or where a speedy action is required, it is best given in emulsion; that of the United States Pharmacopœia contains two drachms of the gum-resin in half a pint of water, and is given in the dose of one or more tablespoonfuls. This is the form in which it is to be used as an enema. Another form is that of tincture, the medium dose of which is a fluid drachm.

Besides the gum-resin, it is stated by Royle (*o. c.*, 410), that the seeds are extensively employed in India, under the name of "Andoojan." They are classed among the stimulants.

Dorema.—*Don.*

Disk epigynous, cup-shaped. Fruit slightly compressed from the back, edged; with 3 distinct, filiform, primary ridges near the middle, and alternating with them 4 obtuse secondary ridges; the whole tomentose. Vittæ, 1 to each secondary ridge, 1 to each primary marginal ridge, and 4 to the commissure, of which 2 are very small.

This genus was instituted by Mr. Don (*Trans. Linn. Soc.*, xvi. 599), on specimens of a plant collected in Persia by Col. Wright, as that affording the Gum Ammoniacum. It differs from Ferula in its sessile flowers buried in wool, in its cup-shaped disk, and the single vitta to the ridges.

D. ammoniacum, *Don.*—The only species.

Don, *Trans. Linn. Soc.*, xvi. 599; Pereira, *Mat. Med.* ii. 489; Lindley, *Fl. Med.* 47; Royle, *Mat. Med.* 412.

Description.—Root perennial, large. Stems 7—9 feet high, and about four inches in circumference at base, clothed with a glandular down (*Don*), smooth (*Fontannier*), glaucous, resembling opoponax. Leaves large, petiolate, somewhat 2-pinnate. Pinnæ in 3 pairs, each pair somewhat remote. Leaflets inciso-pinnatifid, with oblong, mucronulate, entire, or slightly-lobed segments, coriaceous. Petiole sheathing at base, large, tomentose. Umbels proliferous, racemose; partial umbels globose, on short pedicels, usually arranged in a spiked form. General and partial involucre wanting. Flowers sessile, immersed in wool. Petals white, ovate, apex inflected. Margin of calyx with 5 minute, acute, membranous teeth. Disk large, cup-shaped, fleshy. Stamens and styles yellow, the latter complanate, recurved at apex. Stigmas truncate. Ovary very woolly. Fruit elliptical, compressed, with a broad, flat edge. Mericarps with 3 distinct, filiform, primary, dorsal ridges, and, alternating with them, 4 obtuse, secondary ridges. Vittæ, 1 beneath each secondary ridge, 1 beneath each primary marginal ridge, 2 on each side of the suture of the commissure, the exterior being very small.

This description is condensed from those of Don, Lindley, and Fontannier, the latter of whom states that Gum Ammoniacum exudes naturally from the axils of the umbels and the tumid extremities of the peduncles (Merat and De Lens, *Dict.* i. 252). The plant is a native of many parts of Persia, in dry plains and gravelly soil, where it is exposed to an ardent sun.

Although there seems now no doubt as to this species being the source of the Asiatic Gum Ammoniacum, it is also certain that an analogous product is obtained from other plants, and more especially (as has already been noticed) from the *Ferula tingitana*, which is probably the origin of the Ammoniacum of Dioscorides and Pliny, which they say was obtained from a plant growing in Africa, in the vicinity of the temple of Jupiter Ammon, whence its name, and not, as supposed by Mr. Don, from a corruption of Armeniacum. The various opinions as regards the origin of this gum are deserving of a brief notice. Lemery (*Dict.* 37) speaks of it as coming from Lybia, and calls the plant producing it *Ferula ammonifera*. Chardin (*Voyages*, iii. 299) says that the plant affording it is very common in Persia, where it is called *Ouschio c.* Peyrilhe, in his translation of the "Materia Medica" of Linnæus, attributes it to a species of *Pastinaca*. Olivier, who visited Persia, but did not reach the part of the country in which the plant grows, was of opinion, from the information he obtained, that it was a species of *Ferula*, which he named *persica*, but which, Willdenow asserts, produces sagapenum. This latter writer raised a plant from seed picked from a fragment of the gum, and found it to be a species of *Heracleum*, and called it *gummiferum*; but admits that he could obtain no gum-resin from it; and later botanists consider that this plant is identical with *H. pyrenaicum*, a native of the mountains of southern

Europe. Other writers have attributed it to *Selinum gummiferum* (Sprengel, *Bot. Med.* 477). The opinion of Jackson (*Morocco*), has already been noticed.

The first definite account of the origin of this gum was by Captain Hart, in a letter to Dr. Wallich (*Trans. Med. Soc. Calcutta*, i. 369); he saw the plant furnishing it in several places in Persia, and gives a general description of it, accompanied with a poor drawing. It was soon afterwards found by M. Fontannier, who sent specimens to Merat, who considered them as those of a *Ferula*, and proposed to retain it under the specific name given by Lemery. Mr. Don, however, is of opinion that it forms the type of a distinct genus, on which he has bestowed the appellation of *Dorema*, and his views have been generally adopted. In addition to this, it may be mentioned, that Dr. Royle (*Mat. Med.*, 413, note) states, that from fragments of a plant obtained by Aucher-Eloy in the same localities, Jaubert and Spach have described it under the name of *Disernestum gummiferum;* this, Dr. Royle thinks, is only the *Dorema* described from imperfect specimens. From the above, it would appear that the gum-resin in question is certainly the product of two dissimilar plants, one a native of Africa, the other of Persia, and possibly that it may be afforded by other distinct Asiatic species.

According to M. Fontannier, the gum-resin exudes spontaneously; but Captain Hart says, that when the plant is mature, it is pierced in all directions by beetles, and from the punctures thus made, the juice flows out abundantly, and when hardened is picked off. The finest pieces are kept separate, and form the *ammoniacum in tears*, whilst the inferior kinds are pressed together and constitute the *lump ammoniacum*. Major Willock states, that the juice exudes principally from the stems, and either concretes on them or falls to the ground; that it is collected in the autumn, and is conveyed to ports on the Red Sea, whence it is taken to India, and thence sent to Europe and this country.

Gum ammoniac is moderately hard and brittle, but softens with a moderate heat, is inflammable, partially soluble in water, wholly so in alcohol. The taste is unpleasant, bitter, and somewhat acrid. The smell is peculiar, but somewhat like that of galbanum, stronger in the lump than in the tears. According to Braconnot (*Ann. de Chim.*, lxviii. 69) it is composed of Resin 70·; Gum 18·4; Gluteniform substance 4·4, &c. It also contains a small portion of volatile oil.

Its effects on the system are similar to, but less powerful than those of assafœtida, and from containing much less volatile oil, not nearly as stimulating. It appears to have special influence on the bronchial mucous membrane, promoting expectoration.

Medical Uses.—Its principal internal use is in chronic affections of the respiratory organs, in which cases it has been of essential benefit, but is wholly unsuited where there is inflammation or much irritation of the bronchial mucous membrane. It is seldom given alone, being usually combined with other expectorants. Dr. Chapman (*Therap.*, i. 507) speaks highly of a mixture of it with nitric acid, where a large accumulation of purulent and viscid matter exists, with feeble and difficult respiration.

It has also been employed as a diuretic, emmenagogue, and antispasmodic, and at one time was much esteemed as a deobstruent; but is now seldom prescribed to fulfil these intentions. As an external application, it is employed as a discutient in indolent tumours and chronic scrofulous swellings, either alone or combined with mercury, and has been found very beneficial, especially in cases of swellings about the joints. The dose of gum ammoniac is from 5—30 grains, either in pill or emulsion; the latter form, either

alone or in combination, is the preferable mode, when administered as an expectorant.

GALBANUM.—*Don.*

Fruit compressed at the back, elliptical; ridges 7, elevated, compressed, bluntly keeled, not winged; the lateral distinct, marginal. Channels broadish, concave, without vittæ, commissure flat, dilated, with 2 broad curved vittæ.

This genus was established by Mr. Don (*Trans. Linn. Soc.*, xvi. 603) on some seeds found adhering to the gum Galbanum of commerce, and which he supposes may be those of the plant, though no other proof of the fact has yet been adduced.

D. OFFICINALE, *Don.*—The only species.

Don., *Trans. Linn. Soc.*, xvi. 603; Lindley, *Fl. Med.*, 51; Pereira, *Mat. Med.*, ii. 493; Royle, *Mat. Med.*, 414.

The exact habitat of this plant is not known, but it is most probable that it is a native of Persia, which appears to be the head-quarters of the gum-bearing Apiaceæ. The gum-resin itself was very early known, and is supposed to be the substance spoken of by Moses (*Exodus*, xxx. 34) under the name of *Chelbenah*, though he classes it among the sweet spices, which appellation is certainly not applicable to what is now known as galbanum. It was likewise mentioned by Hippocrates, and described by Dioscorides, who states that it is the product of a *Ferula*. Theophrastus, who also speaks of it, attributes it to a species of *Panax;* but as these terms had a very extended signification among the ancient botanists, they afford no clue as to the exact plant, further than that it appertained to the umbelliferous tribe. It was well known to the earlier Arabian physicians, who speak of it under the name of *Barzud*, and call the plant producing it *kinneh* and *nafeel*. D'Herbelot (*Bib. Orient.* 175) says that in Persia the gum is called *Burzud* and the plant *giarkhurst*. The information derived from more modern authorities is not more definite. Lemery (*Dict.* 377) speaks of two kinds of galbanum; one produced in Arabia and Syria, which he says is derived from *Ferula galbanifera*, and the other of Indian origin, and the product of *Oreoselinum africanum galbaniferum*, the latter of which is now known as *Bubon galbaniferum*, and was generally supposed to afford the commercial article, but it has been shown that this plant is a native of the Cape of Good Hope, where no galbanum is produced, and also that it has neither the smell nor taste of this drug. Lobel, who sowed some seed which he found attached to the gum, obtained plants of *Ferula ferulago*, which, although affording a gum-resinous secretion, does not yield true galbanum. Within a few years, Sir John M'Neil sent to England specimens of a plant from Khorassan to which were adhering a gum-resin, which Dr. Lindley thought to be galbanum, and the plant being new, he described it under the name of *Opoidia galbanifera* (*Bot. Reg.* 1839.) Dr. Pereira, however, who examined this product, was unable to identify it with any known gum-resin. It is, therefore, evident, that all that is known with certainty as regards the origin of galbanum, is that it is produced by an umbelliferous plant.

Galbanum is said to be obtained in the same manner as assafœtida, by making incisions into the crown of the root and stalks, and removing the juice which flows out and soon concretes. It is imported both from India and the Levant, which places it probably reaches through the Persian Gulf. As met with in commerce, it is in the form of tears or in lump, the first of which is the purest, having a yellow or brownish-yellow colour, and free from

impurities; the lump-galbanum, which is that commonly met with, is in masses of a brownish or dark brownish-yellow colour, formed of agglutinated tears, and containing many impurities, as sand, fragments of bark, &c. The odour is peculiar and somewhat balsamic; the taste is hot, bitter, and acrid. It is soft, but when exposed to cold becomes brittle, and may be powdered. It forms an emulsion with water, but is soluble in alcohol. According to Missner it contains, Resin, 65·8; Gum, 22·6; Bassorin, 1·8; Volatile oil, 3·4, &c. It has the same action on the system as the other gum-resins already noticed, and is usually considered to rank between assafœtida and ammoniac, being less powerful than the first and more active than the latter. Some German writers are of opinion that it has a special influence on the uterine system, but this has not been confirmed by experience.

Medical Uses.—Galbanum is seldom employed in this country as an internal remedy, but was at one time prescribed in Europe, in chronic affections of the respiratory organs, chronic rheumatism, and amenorrhœa. Externally it is applied as a stimulant and resolvent to indolent swellings, forming the basis of the Compound Galbanum Plaster of the U. S. Pharmacopœia. The dose, when administered internally, is from ten to twenty grains either in pill or in the form of an emulsion.

Anethum.—*Linn.*

Margin of calyx obsolete. Petals roundish, entire, involute, with a squarish retuse lobe. Fruit lenticular, flattened from the back, surrounded by a flattened border. Mericarps with equi-distant filiform ridges; the 3 dorsal acutely keeled, the 2 lateral more obsolete, losing themselves in the border. Vittæ broad, solitary, filling the channels, 2 on the commissure.

A small genus of upright, smooth annuals, with decompound leaves, having setaceous linear segments. The flowers are yellow. They are principally natives of the south of Europe, and of Asia. Most of them have aromatic seeds, which are used as condiments.

A. graveolens, *Linn.*—Fruit elliptical, surrounded with a flat dilated margin.

Linn., *Sp. Pl.* 377; Woodville, t. 159; Stephenson and Churchill, iii. 137; Lindley, *Fl. Med.* 50.

Common Names.—Dill; Common Dill.

Foreign Names.—Aneth, *Fr.;* Aneto, *It.;* Dill, *Ger.*

Description.—Root tapering, long. Stem smooth, from 1 to 1½ foot high, striated, simply branched. Leaves tripinnate, with fine capillary segments; petioles broad and sheathing at base, which has a distinct, somewhat membranous border. Umbels on long stalks, destitute of an involucre. Petals varnished, yellow. Fruit oblong, bright shining brown and convex at the back; paler, and also convex at the edge, which is separated from the base by a deep hollow; dorsal edges sharp, filiform, elevated, very distinct. Commissure dull grayish-brown, with the humid vittæ only indistinctly seen.

The Dill is a native of the South of Europe, Egypt, and Persia, and has been found at the Cape of Good Hope and Timor. It resembles the Fennel very much in appearance, but the odour is less agreeable. It was well known to the ancients, and was in general use among them as a condiment. The part employed in medicine is the seed. This is oval, flat, dorsally compressed, of a brown colour, surrounded by a lighter-coloured membranous border. The odour is aromatic, and the taste warm, pungent, and somewhat bitter. These properties are owing to the presence of a volatile oil; this is of a pale-yellow colour.

Medical Uses.—It is principally employed in Europe to relieve flatulence and colic in infants, but is seldom or never prescribed in this country. The ancients supposed that the seeds were hypnotic, and the oil has been highly recommended in hiccough. The leaves are sometimes employed for culinary purposes as a substitute for fennel.

The fruit of another species, *A. sowa*, is esteemed in India as an ingredient in curries, and also as a carminative in flatulent colic, and in infusion as a cordial drink to women after lying in. (Ainslie, *Mat. Ind.* i., 109.)

Heracleum.—*Linn.*

Calyx 5-toothed. Petals obovate, emarginate, with an inflected lobe; the outer often radiating and bifid. Fruit flattened at the back, with a broad flat border. Mericarps with very fine ridges; the 3 dorsal equidistant, the 2 lateral distant from the others, contiguous to the margin. Vittæ solitary in the channels, usually 2 on the commissure, all shorter than the fruit, and mostly clavellate.

A genus of large, coarse, herbaceous plants, with pinnate, 3-parted or lobed leaves, having large sheathing petioles. The umbels are many-rayed, and the involucre usually of a few, deciduous leaves. The species are chiefly European; one, however, is a native of North America, and is officinal.

H. lanatum, *Michaux.*—Stem sulcate, pubescent, leaves ternately divided, tomentose, pubescent beneath; the segments petiololate, roundish-cordate, lobed; fruit oval or obovate.

Michaux, *Fl.* i. 166; Torrey and Gray, *Fl.* i. 632; Rafinesque, *Med. Fl.* ii. 227.

Common Names.—Cow Parsnip; Masterwort.

Description.—Root large, with a strong unpleasant smell. Stem 4—8 feet high, and often an inch or more in diameter at the base. Leaves very large; ternately divided; tomentose beneath; the segments almost petiolate, unequally lobed; the lobes acuminate and almost glabrous above. The umbels are very large, and spreading, with an involucre of 6—10 oblong-lanceolate, deciduous leaflets. Involucel composed of lanceolate leaflets which are narrowed to a long point. Flowers white; petals of the exterior ones unequal, as if unequally 2-cleft, owing to the enlargement of the lobes on each side of the inflexed apex. Fruit nearly half an inch long, often emarginate. Vittæ of the channels clavate. Commissure usually with 2 vittæ.

It grows in damp places in most of the northern and middle parts of the United States. It is closely allied to the foreign *H. spondylium*. It was considered as a powerful remedial agent by the Aborigines, but has attracted little attention from physicians, though it is certainly possessed of active qualities. Dr. Bigelow (*Mat. Med.* 203) is of opinion that it is virose, and should be used with great caution, especially when gathered from a watery situation. The odour of the leaves and root is unpleasant and rank, and the taste is pungent and acrid. When applied to the skin in a fresh state, the root is capable of producing vesication.

Medical Uses.—The root in a dried state has been used as a diuretic, expectorant, and antispasmodic. It, as well as the leaves, are employed by empirics in a variety of disorders, and to fulfil the most opposite indications. The only account of its powers that can be relied upon, is in a communication to the Massachusetts Medical Society in 1803, by Dr. Orne of Salem, in which he gives his experience with it in epilepsy, and states, that three cases in five in which he administered it, were cured. He gave it in large doses, both in

substance and infusion. This writer admits that in these cases the disease did not appear to be dependent on a primary affection of the brain, but on a disordered condition of the digestive organs. Its good effects as a stomachic and carminative are confirmed by other practitioners, and Dr. Coxe says (*Amer. Dispen.* 326) that in some cases of dyspepsia, accompanied with flatulence and cardialgia, a strong decoction of it has been found very beneficial.

The leaves are used externally as rubefacients, and form a good cataplasm in abscesses, and the seeds are said to be expectorant. Dr. Richardson (*Faun. Bor. Am.*) says that the Northern Indians use a portion of the hollow stem of this plant to imitate the voice of the male deer, and thus to attract the females within gun-shot.

The *H. spondylium* of Europe has somewhat similar properties to the above; the leaves being used in cataplasms, and the bruised root as a caustic to remove warts, while the seeds are considered to be carminative. Notwithstanding the acridity of the root, it is stated to contain sugar. (Lindley, *Fl. Med.* 51.) The *H. panaces* and *H. sibiricum* have very saccharine roots, which afford on distillation an agreeable alcoholic liquor. The roots of *H. tuberosa* are eaten in Chili (*Molina*, 108), and in Sicily it is said the root of *H. cordatum* is used instead of Angelica. It is aromatic, and endowed with the qualities for which the officinal article is prized. *H. gummiferum*, as has been stated, was considered by Willdenow to furnish gum ammoniacum, from his having raised this plant from seeds picked from a specimen of the gum.

Section 6. Cumineæ.—Fruit with primary and secondary ribs. Ribs wingless, fruit somewhat laterally contracted.

Cuminum.—*Linn.*

Calyx teeth 5, lanceolate, setaceous, unequal, persistent. Petals oblong, emarginate, erect, spreading, with an inflexed lobe. Fruit contracted on the side. Mericarps with wingless ridges, the 5 primary filiform, minutely muricated, the laterals forming a border; the 4 secondary prominent and aculeated. Channels under the secondary ridges with 1 vitta in each. Carpophore bipartite.

A genus of herbaceous plants, principally natives of Asia, having multifid leaves, the lobes of which are setaceous. The flowers are white or pink. They all bear aromatic seeds, which are much used in the East as condiments. One species, the *C. cyminum*, is officinal in the British Pharmacopœia, but it is not recognised in that of the United States. Cumin is rarely employed internally as a medicine, but is sometimes substituted as a condiment for caraway, which it resembles, but is less agreeable to the taste. These seeds are, however, much employed in veterinary practice.

Section 7. Thapsiæ.—Fruit with primary and secondary ribs. Secondary ribs mostly winged; wings unarmed.

Thapsia.—*Linn.*

Margin of calyx 5-toothed. Petals elliptical, entire, acuminate, with the apex inflected. Fruit compressed from the back. Mericarps with 5 primary filiform ridges of which the 3 middle ones are at the back; the two lateral on the plane of the commissure; and 4 secondary, the dorsal being filiform, the lateral membranous, winged, entire. Channels beneath the secondary ridges with each 1 vitta.

Perennial herbaceous plants with decompound leaves and sheathing petioles, the upper leaves often reduced to the petiole alone. Umbels large, many-rayed. Involucres deciduous. Flowers yellow. Inhabit Asia, Northern Africa, and Southern Europe. These plants all appear to be active, but are principally interesting from the circumstance of one or more of them affording the celebrated *Silphion* or *Laser* of the ancients. This gum-resin has been successively stated to be the product of *Opoponax*, of *Ferula tingitana*, of *Laserpitium siler*, and *gummiferum*, *Thapsia asclepium*, &c., but the researches of Della Cella in Cyrene, appear conclusively to show that it is procured from the *T. silphion*, Viviani. This is the only umbelliferous plant of that district of country that agrees with the representations of it on ancient coins and monuments.

The *Laser cyrenaicum* or Asadulcis of Cyrene, which was deemed the best, was held in the highest estimation for its curative powers. According to ancient writers it would neutralize poisons, cure the worst wounds, restore sight to the blind, &c. So great was its reputation that it was represented on the coins of Cyrene, and it was estimated at its weight in gold. It must have been very early known, for among the representation of Etruscan antiquities, of a date anterior to the foundation of Rome, figures of the plant are to be recognised. Although the powers attributed to it are evidently extravagant and absurd, there can be no doubt that it must have been an active and efficacious remedy, and one that deserves attention, now that its true origin has been discovered. In consequence of the great demand for it, the plants furnishing it at Cyrene became exterminated, and various analogous gum-resins were substituted for it, thus Pliny (*Hist. Nat.* l. xxii. c. 23) says, that in his time it was chiefly imported from Syria, the best coming from Media and the worst from Parthia, that of Cyrene being wholly exhausted.

Daucus.—*Linn.*

Margin of calyx 5-toothed. Petals obovate, emarginate, with the apex inflected; the outer ones usually radiating and bifid. Fruit somewhat compressed from the back, ovate or oblong. Mericarps with the 5 primary ridges filiform and aculeated; the 3 middle ones at the back, the lateral on the plane of the commissure; the 4 secondary equal, prominent winged, split into a single row of spines. Vittæ single in the channels below the secondary ridges.

The species of this genus are generally biennials with bipinnate leaves. The bracts of the involucre are multifid, leafy. The flowers are white or yellowish, the central one usually dark purple, fleshy and sterile. They are mostly natives of countries bordering on the Mediterranean, but the cultivated species, *D. carota*, is found in many parts of the world, but is probably only naturalized and not truly a native.

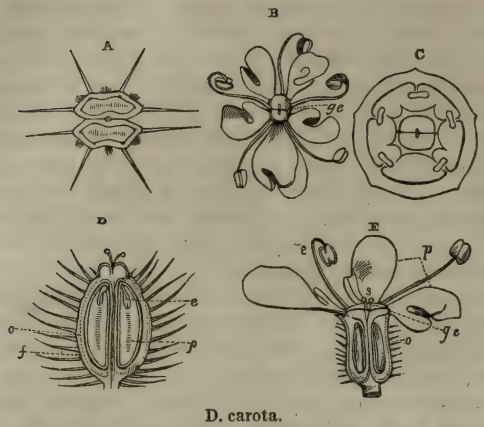
D. carota, *Linn.*—Stem hispid; leaves tripinnate; leaflets incised, linear-lanceolate, acute; umbel concave; fruit bristly.

Linn., *Sp. Pl.* 348; Torrey & Gray, *Fl.* i. 635; *Eng. Bot.* t. 1174; Stephenson and Churchill, i. 56; Woodville, t. 161.

Common Names.—Carrot; Common carrot.

Foreign Names.—Carotte, *Fr.*; Carota, *It.*; Gemeine möhre, *Ger.*

Fig. 159.



D. carota.

A. Horizontal section of fruit. B. Flower seen from above. *g*, *e*. disk. C. Plan of flower. D. Vertical section of fruit. *f*. Pericarp. *o*. Seed. *p*. Albumen. *e*. Embryo. E. Vertical section of flower. *p*. Petals. *e*. Stamens. *o*. Ovary. *s*. Styles and stigmas. *g*, *e*. Disk.

Description.—Root slender, yellowish, aromatic and sweetish. Stem 2 or 3 feet high, erect branched, leafy, hairy. Leaves alternate, on broad, concave ribbed petioles, bipinnate, incised, narrow, acute, distantly hairy. Umbels solitary, large, white, except a central neutral flower, which is dark red. General involucre, with the leaflets pinnatifid, nearly the length of the umbel; those of partial one undivided, or partly 3-cleft, membranous at the edges. Fruit small, pale dull brown, oval. Mericarps with the primary ribs filiform, bristly, three near the middle of the convex back, and two on the plane of the commissure. Secondary ridges deeper and irregularly split into setaceous lobes. Vittæ, one under each secondary ridge, and two on the commissure.

The Carrot is a native of many parts of Europe, and is extensively naturalized in the United States, and in both countries is generally cultivated for its esculent roots. The root of the Wild carrot is whitish yellow, hard, of a strong smell, and unpleasant, somewhat acrid taste; that of the cultivated is from a reddish-yellow to a dark red colour, succulent, of a pleasant, somewhat aromatic odour, and a sweet, mucilaginous, peculiar taste. The seeds are light, of a dull brownish colour, an oval shape, convex and bristly on one side, and flat on the other. They have a warm, pungent, bitterish taste, and an aromatic smell. The root of the cultivated kind contains some volatile oil and a large proportion of pectin, a peculiar colouring principle called *carotin*, and some sugar. That of the wild variety has much more volatile oil, which is also found, but in larger proportion, in the seeds. This oil is of a pale yellow colour.

Medical Uses.—The root of the wild variety and the seeds of both kinds are stimulant, carminative and diuretic, and have been administered to fulfil these intentions. An infusion of them is said to relieve strangury from blisters. The root of the garden carrot has attained some reputation as an external application to unhealthy and foul ulcers, and is considered useful in correcting and even altering the morbid condition of the parts. To fit it for this purpose it is scraped or grated. When boiled it becomes perfectly mild, and on being mashed forms a very good emollient cataplasm, but retains none of its peculiar properties.

Campylospermæ.

Section 7. Smyrnieæ.—Fruit with primary ribs only, laterally compressed. Fruit turgid.

Prangos.—*Lindley.*

Calyx a 5-toothed rim. Petals ovate, entire, involute at the point. Disk depressed, scarcely visible in the fruit. Fruit nearly taper, with a broad commissure. Mericarps compressed at the back, with 5 smooth ridges, thick at the base, ending in vertical membranous wings. Vittæ numerous.

A small genus of perennial herbs, founded by Lindley on the *P. pabularia*, a large species, the leaves of which are dried and form the winter food of cattle in the north of India, and are considered highly nutritious; from its stimulating effects it is said by Mr. Moorcroft to destroy the fluke worm in sheep. It is only interesting in a medical point of view on account of Dr. Royle having suggested (*Illustrations*, 230), that it was one of the kinds of Silphion of the ancients, described by Arrian as growing on the mountains of Northern India (*Paropamisi*), and fed on by sheep. Sir A. Burnes found it in the spot spoken of by Arrian, greedily eaten by sheep, and even forming food for man, and was convinced that it was the plant noticed by the Greek historian.

Conium.—*Linn.*

Margin of calyx obsolete. Petals obcordate, with a short inflected apex. Fruit ovate, compressed at the sides. Mericarps with 5 prominent, equal, undulate-crenate ridges, of which the lateral are at the edge. Channels with numerous striæ, but no vittæ.

A small genus of biennial plants, with fusiform roots; terete and branched stems, and decompounded leaves; they are all poisonous.

C. maculatum, *Linn.*—Stem glabrous, spotted; segments of the leaves lanceolate, pinnatifid, the lobes acute; leaflets of the involucel lanceolate, shorter than the umbel.

Linn., *Sp. Pl.* 349; Torrey and Gray, *Fl.* i. 640; Bigelow, *Med. Bot.* i. 113, t. ii.; Rafinesque, *Med. Flor.* i. 118, t. 25.

Common Names.—Hemlock; Poison Parsley, &c.

Foreign Names.—Cigue ordinaire, Grande Cigue, *Fr.*; Geflecter shierling, *Ger.*; Cicuta, *It.*

Description.—Root fusiform, whitish, fleshy. Stem from three to five feet high, erect, round, hollow, glaucous, polished, often spotted with purple. Leaves large, of a bright-green, repeatedly compound; leaflets ovate, closely and sharply pinnatifid, with the lower lobes incised; petioles long, furrowed, and sheathing at base. Umbels terminal, numerous, erect, and compound; all many-rayed and smooth. General involucre ovate, cuspidate, with membranous edges. Flowers all fertile, white, the outermost slightly irregular.—Fruit ovate, compressed, of a pale-green colour; primary ridges elevated, sharp, undulated; commissures and channels finely wrinkled.

Fig. 160.

C. maculatum.
a. Vertical section of fruit. *b*. Transverse do. *c*. Fruit. *d*. Flower.

This plant is a native of Europe and parts of Asia, and is naturalized in many places in the United States. It has a disagreeable, virose smell, which is more power-

ful when it is bruised or broken. During the spring the root contains a milky, poisonous juice. The whole plant is eminently narcotic and virulent, but varies in power according to its place of growth and the temperature. Thus it is said to be most active when growing where it is exposed to the full power of the sun, and it is well ascertained that the hemlock of the southern parts of Europe is far more energetic than that of more northern countries. The part used in medicine is the leaves; these should be gathered when the plant is just done flowering, and the fruit beginning to form. The leaves should be deprived of their footstalks, and quickly dried, and then preserved in close vessels, so as to exclude them as much as possible from the air and light; or else pulverized, and the powder kept in opaque and well-stopped bottles.

The Hemlock was known to the ancients, and is supposed, on good grounds, to have been the poison employed in Athens to destroy Socrates and Phocion. This opinion is rendered probable from the fact that the plant grows abundantly between Athens and Megara (Sibthorp, *Prod. Fl. Gr.* i. 187), and also that no other vegetable of equally virulent qualities, is a native of Greece, the *Cicuta virosa* and other lethal umbelliferæ not being found there; and that it belonged to this class, is shown by the description of it by Dioscorides. It has been urged, on the other hand, that no mention being made by the Greek writers of the purple spots on the stem, militates against this view of the subject. Pliny, in noticing the plant under the name of *Cicuta*, uses the term *nigricans*, which is thought, by Dr. Christison, not to be applicable to Conium; but specimens may be found in this country, some of which are almost destitute of marks answering to the plant mentioned by the Greek writers, and others having them of so dark a purple that they might be termed *blackish* without impropriety. According to Theophrastus, the juice was mixed with opium, when it was given to destroy criminals, to render it less liable to produce convulsions, hence the easy death of Socrates, by this poison, may be accounted for. It was also employed as a remedial agent, and is noticed as such by Hippocrates and Galen. Pliny speaks of it in high terms as a preventive against drunkenness.

It has been often analyzed; the results of an examination of it by Brandes, show it to contain a peculiar alkaloid (*Conia* or *Conein*), a Volatile oil, some Resin, Albumen, &c. To the first of these it owes its peculiar properties, as the volatile oil, although having the odour of the plant in a high degree, has little or no poisonous action on the system. Conia exists in larger proportions in the seeds than in the leaves. It is a colourless, oily fluid, which in the plant is combined with an acid called the *coniic*, and is obtained by distillation with an alkali. It is sparingly soluble in water, and more so in alcohol. Some of its salts are crystallizable, and all of them evolve a vapour of conia on the addition of a caustic alkali. It forms insoluble compounds with tannin, which precipitates it from all its solutions. Its odour is strong and penetrating. It is extremely poisonous, even in very small doses.

Medical Uses. — Hemlock is a narcotic, but is neither stimulant nor sedative. In moderate doses it sometimes also acts in increasing the secretions, and when long continued, is apt to disorder the digestive and nervous functions, and to occasion dryness of the throat, and a peculiar eruption on the skin. The ancients thought that it acted specifically on the testicles and breasts, and some cases seem to show that such is occasionally the fact. When taken in large doses it causes vertigo, dimness of sight, nausea, faintness, &c., and in an increased quantity, dilatation of the pupils, difficulty of speech, delirium or stupor, tremors, paralysis, and finally convulsions and death.

It is principally employed to relieve pain in malignant tumours, but does not appear ever to act as a curative agent in these complaints, though some practitioners assert that their removal has been accomplished by a long-continued use of it. Hemlock has also been highly spoken of as a deobstruent and alterative in chronic enlargements of the liver and other visceral organs; in scrofulous tumours, and glandular swellings, in some obstinate diseases of the skin, as elephantiasis and leprosy, in chronic rheumatism and neuralgia, &c. It has likewise been praised as an antispasmodic in pertussis, asthma, and chronic catarrh, and even in tetanus. It is sometimes used externally in the form of a cataplasm in cancerous and other foul ulcers; and as a fomentation to painful swellings.

Its usual preparations are the powder, tincture, extract, ointment, and poultice. The dose of the powdered leaves is from three to four grains twice a day, to be gradually increased, till some obvious effects are induced. The extract, which is often worthless, and not to be depended upon, and even when well made, contains but little conia, according to Drs. Christison and Pereira, is usually administered in the same doses as the powder, which are to be increased in the same manner. The tincture is often a good mode of giving Hemlock; the dose is from thirty minims to a drachm. It should be borne in mind, that to keep up a given impression, it is requisite to increase the doses of these preparations very rapidly, and as the strength of all of them is exceedingly unequal, the same parcel should always be used, or if a change be made, small doses of the new one be commenced with, so as to obviate any danger that might arise from its greater power. The cataplasm is made either from the juice of the fresh leaves, or from a decoction of the dried ones, or even from a solution of the extract mixed with a due quantity of linseed or corn meal.

Cœlospermæ.

Section 8. Coriandreæ.—Fruit laterally compressed, didymous, or globose.

Coriandrum.—*Linn.*

Calyx-teeth 5, acute, unequal, permanent. Petals obovate, emarginate, with inflexed lobes, the exterior radiating and bifid. Fruit globose. The mericarps with 5 primary depressed, undulated ridges, and 4 secondary ones more prominent and carinate. Channels destitute of vittæ; commissures with 2 vittæ. Seed excavated in front, with a loose skin.

Fig. 161.

C. sativum.

1. A portion of an umbel in fruit. 2. A fruit magnified. 3. Transverse section of the same.

The only species that requires notice is *C. sativum*, an annual, inhabiting the southern parts of Europe, and affording a dry, globular fruit, having a peculiar smell, and pleasant, aromatic taste. In a fresh state, these, as well as the whole plant, have a disagreeable odour, resembling that of bugs. Coriander is aromatic and carminative, and may be used like other articles of its class. Cullen considered it as a

better corrective of the odour and taste of senna than any other aromatic. It is more used to flavour confectionary than in medicine.

Order 54.—ARALIACEÆ.—*Richard.*

Calyx adherent to the ovary. Petals 5—10, inserted with the stamens on the top of the ovary. Stamens equal in number to, rarely double the number of the petals. Ovary crowned with a disk, 2—15-celled. Styles erect, and connivent or spreading. Stigmas simple. Fruit drupaceous or baccate, sometimes nearly dry, but the carpels adherent. Seed solitary in each cell. Embryo short, at the base of the copious, fleshy albumen.

This small order is closely allied to Apiaceæ, and differs from it chiefly in having more than two cells in the ovary, in the greater number of styles, and in the baccate character of the fruit. It consists of trees, shrubs, and perennial herbs, with exstipulate, simple, or compound leaves, the petioles thickened and dilated at base. The flowers are generally umbellate. The species are found in various parts of the world, some of them in very high latitudes. Their general qualities are those of stimulants and aromatics. Besides those to be more particularly noticed, this order contains several plants possessed of some interest; thus the *Dimorphantus edulis* is used in China as a sudorific, and its young shoots eaten as a delicate vegetable. Several species of *Gunnera* are also possessed of some activity. The *G. scabra* affords an astringent used for tanning, and its leaf-stalks are eaten. The leaves are very large; Mr. Darwin measured one, near Chiloe, which was nearly eight feet in circumference. The fruit of *G. macrocephala* is considered, in Java, to be a stimulant. Another species, found in Abyssinia, is stated, in Harris's Ethiopia (*Append.* v.), to be much used for food in a raw state. The parts used are the stalks and petioles; their taste is similar to that of sorrel.

Panax.—*Linn.*

Calyx 5-toothed. Corolla 5-petaled. Stamens 5. Styles 2. Fruit a 2-seeded berry.

Most of the species are herbaceous, with perennial roots; but a few are shrubby, and differ so much from the type of the genus, that they may, perhaps, be found wholly distinct. Some confusion exists with respect to the herbaceous species, as they approach each other very closely in their characters.

P. quinquefolium, *Linn.*—Root fusiform, sometimes branched. Leaflets 5 or 6—7, petiolate, obovate, oblong, lateral ones smaller. Peduncle as long as the petioles. Styles and cells of the ovary 2.

Linn., *Sp. Pl.* 1512; Torrey and Gray, *Fl.* i. 647; Bigelow, *Med. Bot.* iii. 82; Barton, *Veg. Mat. Med.*, ii. 191; Rafinesque, *Med. Fl.* ii. 52.

Common Names.—Ginseng; Red-berry; Five-fingers, &c.

Foreign Names.—Ginseng d'Amerique, *Fr.;* Ginsang, *It.;* Kraftwurzel, *Ger.*

Description.—Root fusiform, often branched, fleshy, with transverse wrinkles. Stem erect, one to two feet high, round, green below, purplish-red above, divided at top into three petioles, having a central peduncle at their base. The petioles are long, and commonly are furnished with five, but sometimes with only three leaflets. These are ovate, acuminate, doubly serrate, dark-green above, paler beneath, smooth on both sides, supported on partial footstalks, which, like the general ones, are tinged with red at their

insertion. Flowers small, in a globose umbel, supported on a central, erect peduncle; this is at first short, but gradually becomes elongate. The umbel is furnished with an involucrum of numerous, small, subulate leaves. The calyx is 5-toothed, persistent. The corolla consists of five, white, fugacious petals. The stamens are also five, with round anthers. The ovary is ovate, and supports two recurved styles. The fruit is red, baccate, reniform, with two semi-globose seeds. Sometimes there is only one style and a dimidiate berry, or three styles and a trilobate fruit. Nor is it uncommon to find abortive or barren flowers.

Fig. 162.

P. quinquefolium.

The Ginseng occurs in most parts of the temperate portions of the United States; but is most common to the westward, being almost eradicated in the Atlantic States. It is usually found at the roots of trees, in rich soil, especially in hilly situations. From some trials that have been made, it has not been found to succeed well, when attempted to be cultivated.

The Ginseng has attained much celebrity, from the astonishing virtues attributed to it in China, where it is considered in the light of a panacea in all diseases. Notwithstanding the large quantities of this root sent from this country to China, and their being recognised as the true Ginseng, and that most botanists have declared that the plants are identical, it is now admitted, by some of the best authorities, that they are distinct species, though very closely allied. Nees v. Esenbeck calls the Asiatic species *P. Schinseng*, and admits three varieties, one of which is the *P. pseudo-ginseng* of Wallich (*Plant. Asiat. rarior.*) The mistake originally arose from the Jesuits, some of whom becoming acquainted with the plant in Tartary, thought that they recognised it in the American species, and, in consequence, it was sent to China, where, although considered as an inferior kind, it met with a ready sale. But the market has fluctuated very much, as, from a fancied deterioration in the article, or from other causes, it sometimes has not paid freight and charges.

The Asiatic kind is found principally in Chinese Tartary, between 39° and 47° N. latitude, in the same kind of localities as in this country. The collection of it is a monopoly enjoyed by the Emperor, who guards the districts in which it grows with great vigilance. Those who are employed to collect it, each deliver two catties of the best roots gratuitously, and are paid

its weight in silver for all over this quantity. This, according to Father Jartoux, insures the Emperor about 20,000 catties, at about a fourth of their market price.

Ginseng has a peculiar and rather pleasant smell, with a sweet, somewhat aromatic and pungent taste. No analysis has been made of it; but Rafinesque states that it owes its properties to a peculiar substance, very similar to camphor, which he calls *Panacine*. He says that this is white, pungent, soluble in alcohol and water, and more fixed than camphor; but this requires confirmation.

Medical Properties.—According to the Chinese authorities, this substance nourishes and strengthens the body, stops vomiting, clears the judgment, removes hypochondriasis and all other nervous affections, and in short, gives a vigorous tone to the human frame, even in old age, and is an effectual remedy in all complaints. It is given by them in a variety of forms, and the only ill result that it is capable of producing, is a tendency to hæmorrhage, where it is used in over-doses. It may be stated, that Father Jartoux and other persons who have used the Chinese root, are of opinion that many of the virtues attributed to it are real, and that it is a highly valuable remedy. On the other hand, the trials made with it in this country and in Europe, show that the American species is merely a gentle stimulant, with some antispasmodic powers. No fair and extended trial of it, however, has been made. As regards the Chinese kind, it is difficult to come to any just conclusion, for it can scarcely be possible that any article so long in use and so highly prized, can be wholly worthless; and yet there is much reason to believe that its beneficial effects are rather to be ascribed to fashion and the effects of imagination, than to any intrinsic virtues in the root.

The other species of *Panax* are *P. ginseng*,—this is said by Meyer to be the true Ginseng of the Chinese, and to have a sharp, aromatic, peculiar taste;—*P. fruticosum*, and *P. cochleatum*, are fragrant aromatics, and are employed in the Moluccas, according to Loureiro (*Flor. Coch. Chin.*, ii. 656). The fruit is diuretic, and displays some powers in dropsy, dysury, and bloody urine. *P. anisum* has fragrant berries, having the odour of aniseed.

Aralia.—*Linn.*

Flowers mostly perfect. Limb of the calyx short, 5-toothed or entire. Petals 5, spreading. Stamens 5, alternate with the petals, filaments short. Styles 5, at length divaricate. Drupe baccate, 5-lobed, 5-celled.

A small genus peculiar for the most part to North America and Eastern Asia; it is composed of shrubs and perennial herbs, mostly with compound leaves, having their petiole sheathing at base, and the umbels of flowers often panicled. Most, if not all of the species, are possessed of medicinal properties. Two are recognised in the U. S. Pharmacopœia.

1. A. nudicaulis, *Linn.*—Nearly stemless, leaf mostly solitary, triquinate; leaflets sessile, smooth, oblong, oval, acute, serrate; scape shorter than the leaf, umbels 3, on long peduncles; not involucrate.

Linn., *Sp. Pl.* 393; Rafinesque, *Med. Bot.* i. 53; Torrey and Gray, *Fl.* i. 646.

Common Names.—Spikenard; False sarsaparilla; Wild liquorice, &c.

Description.—Root perennial, brown, cylindrical, horizontal, giving rise to a single, very short stem, from which arise a single scape and one leaf; this latter is triquinate or triternate; the leaflets are ovate, rounded at base, serrulate, acuminate; the lateral ones are sessile, and the terminal petiolate. The scape is shorter than the leaf, and supports three pedunculated umbels; it is furnished at base with scarious scales. The flowers are yellowish or greenish-white, small. The calyx is greenish, united to the ovary, and 5-toothed. The petals are oboval, obtuse. The stamens and styles are filiform. The fruit is small, round, juicy, and purplish-black.

Fig. 163.

A. nudicaulis.

This plant is found from Maine to Georgia, but is most common in the Northern and Middle States. It usually occurs in rocky woods, in a good soil, and flowers about the end of May and beginning of June. The root, which is the officinal portion, is of a brown colour, variously twisted and contorted, possessing a fragrant, balsamic smell, and a warm, aromatic, sweetish taste: the berries partake of these qualities, but not to an equal degree.

Medical Properties.—The root is a mild, stimulating diaphoretic, and alterative, and has been advantageously employed as a substitute for sarsaparilla. It has been used with some success in rheumatic, venereal, and cutaneous affections. Dr. Mease (*Phil. Med. Mus.* ii. 161), states a watery infusion was beneficial in zona, and also as a tonic in dyspepsia. It has likewise obtained some reputation in domestic practice in pulmonary diseases, but should not be administered whilst inflammation exists.

2. A. SPINOSA, *Linn.*—Stem and leaves prickly; panicle much branched; umbels racemose; involucre few-leaved.

Linn., *Sp. Pl.* 392; Torrey and Gray, *Fl.* i. 647; Michaux, *Fl.* i. 186.
Common Names.—Prickly ash; Angelica tree; Prickly elder, &c.

Description.—A small tree, with a crooked, shrubby, unbranched stem, which is naked and prickly below, with the leaves crowded at the summit of the stems, somewhat like the palms; it is generally not more than ten to twenty feet high, but to the south attains a height of thirty, and even sixty feet. The petioles are very long and prickly. The leaves are bipinnately compound, composed of ovate-acuminate, serrate, mostly glabrous leaflets, which are somewhat glaucous beneath. The umbels are in large, much-branched panicles, with small, few-leaved involucres. The flowers are white, with connivent styles,

Sometimes they are polygamous, as the number of berries bears no proportion to the flowers. The fruit is a blackish, juicy berry.

The Angelica grows from New York to Florida, but is most common, and attains a much larger size in the Southern States; it flowers from June to August. The bark, root, and berries, are all medicinal, but the first only is recognised by the Pharmacopœia. This bark is thin, of a grayish colour externally, and a yellowish-white within; its odour is aromatic, but peculiar, and its taste bitterish, pungent, and acrid.

Medical Properties.—It is much more stimulating than the *A. nudicaulis*, but is used in the same affections. According to Mr. Elliott, an infusion of the recent root is emetic and cathartic (*Sketches, &c.* i. 373); and Dr. Mease states that the watery infusion when employed as a diaphoretic, should be made very weak, as it is apt to create nausea, and cause great irritation of the salivary glands in some persons. The tinctures, both of the roots and berries have been used with some success in chronic rheumatism and from their pungency, have been found beneficial in toothache. Like all other stimulating diaphoretics, this article has also enjoyed some reputation as a remedy in rattlesnake-bites.

The *A. racemosa*, or large Spikenard, and the *A. hispida*, or Wild Elder, appear to be endowed with the same therapeutic qualities as the above, and the first has been favourably spoken of as an application to chronic ulcers, and according to Michaux, was held in great repute among many of the Indian tribes as a diaphoretic. Of the Asiatic species, little is known except the few remarks on them by Loureiro (*Flor. Cochin.*), from which it would appear that they are very analogous in their remedial properties to those of the United States.

Hedera.—*Linn.*

Calyx 5-toothed. Petals broadest at base. Style simple. Berry 5-seeded, crowned by the persistent calyx.

A small genus of perennial plants, climbing by means of numerous radicles, by which they attach themselves firmly to hard substances. The name is derived from *hærere*, to adhere. The species are found in Europe and the East Indies; one of them has attracted some attention for its medicinal properties.

H. helix, *Linn.*—Leaves 5-lobed. The lobes angular. Floral leaves ovate. Umbel erect.

Linn., *Sp. Pl.* 283; Hooker, *Fl. Scot.* 82; *Eng. Bot.* 1267; *Flor. Med.* iv. 218.

Common Names.—Ivy; Common Ivy.

Foreign Names.—Lierre, *Fr.*; Edera, *It.*; Epheu, *Ger.*

The Ivy is a native of many parts of Europe, and is cultivated in the United States. There are several varieties, the most striking of which has entire leaves and yellow berries; this is the *Hedera poetica*, from its being used by the ancients to crown poets. The wood is porous and light, and was formerly employed to make vessels for filtering wine. (*Pliny*, lib. xvi. c. 34.) At one time the Ivy had much reputation for its medicinal virtues, but has been superseded by more active articles.

The berries are bitter, purgative, and sometimes emetic, and were at one time in some repute in febrile affections; Boyle considered them to be sudorific, and in the great plague in London they were administered, in combination with vinegar.

The leaves are bitter, astringent, and nauseous, and have been employed to dress issues and ulcers, and a decoction of them in the treatment of itch, and to destroy vermin in the hair, which latter it is said is stained black by this application; in cataplasm they are stated to be useful in chronic enlargements of the glands.

A gum-resin is obtained from the stem of old plants; this is of a blackish colour, with a somewhat aromatic odour, especially on being burnt. It was prescribed by Stahl and others as a stimulant, emmenagogue, and deobstruent, but does not appear to be possessed of any active properties; at present it is only used in the manufacture of a varnish.

Some other species have been employed, as the *H. umbellifera*, a native of Amboyna; this yields a wood, having the smell of Lavender and Rosemary. The *H. terebintacea* of Ceylon affords a resinous product, resembling turpentine.

Order 55.—CORNACEÆ.—*Torrey and Gray.*

Calyx adherent to the ovary, 4—5-toothed, small or 4—5-lobed. Petals equal in number to divisions of the calyx, distinct; æstivation valvate. Stamens 4—5, inserted with the petals, and alternate with them. Anthers introrse, mostly cordate. Ovary 1—2-celled. Styles single. Drupes baccate, with a 1—2-celled nucleus, crowned with the remains of the calyx. Seeds anatropous.

A small order formerly included in Caprifoliaceæ, but very distinct from it. It consists of trees or shrubs, and a few herbaceous species, with a bitter bark. The leaves are generally opposite, in a few instances somewhat alternate, mostly entire, without stipules. The flowers are cymose, and sometimes involucrate.

Cornus.—*Linn.*

Limb of the calyx 4-toothed, minute. Petals oblong, spreading. Filaments slender. Style subclavate. Stigma obtuse or capitate. Drupes not connate. Flowers white, or rarely yellow.

A genus of about twenty species, most of which are trees or large shrubs, but two of them are herbaceous. The flowers are capitate or umbellate, and involucrate or corymbose, or paniculate and involucrate. More than half the species occur in North America, some of them common to both continents.

1. C. florida, *Linn.*—Leaves of involucre 4, obcordate, or with a callous notch at apex. Drupes oval. Leaves ovate, acuminate.

Linn., *Sp. Pl.* 171; Bigelow, *Med. Bot.* ii. 73, t. 28; Barton, *Veg. Mat. Med.* i. 43; Rafinesque, *Med. Flor.* i. 131; Torrey and Gray, *Fl.* i. 652; Ellis, *Am. Jour. Pharm.* i. 265.

Common Names.—Dogwood; Box-tree; Great-flowered Cornel, &c.

Foreign Names.—Cornuillier à grandes fleurs, *Fr.*; Corniolo, *It.*

Fig. 164.

C. florida.

Description.—A small tree with a rough, dark-brown bark, much fissured. The branches are opposite, spreading, with a reddish bark. Leaves opposite, petiolate, ovate, entire, acuminated, somewhat glaucous beneath. Flowers terminal, appearing when the leaves are just developed, with a large four-leaved involucre, of a white or pinkish colour; the apex of each is notched, callous, and of a purplish colour. The flowers are aggregated in the centre of the involucre, small, and of a greenish-yellow colour. The calyx is campanulate, with four obtuse teeth. The corolla has four oblong, obtuse petals. The stamens are also four, erect, with oblong anthers. Style short, erect, bearing an obtuse stigma. Fruit ovate, crimson or scarlet drupes, each containing a two-celled and two-seeded nut.

It is found in most parts of the United States, especially in swampy and moist woods; it flowers from February to June, according to climate, but always about the time for planting Indian corn, as was well known to the aborigines. The wood is hard, heavy, and compact, susceptible of a high polish. The sap is white and the heart chocolate colour. It is used for a variety of purposes, where strength and hardness are required, and might be applied to most of the purposes for which the Box is employed. The young branches, deprived of the bark, and the ends chewed or pounded, so as to separate the fibres, are often used for cleaning the teeth, instead of a brush.

The officinal portion is the bark, especially of the root; this, as found in the shops, is in pieces of various sizes, more or less rolled, sometimes with a fawn-coloured epidermis, and sometimes deprived of it; of a reddish-gray colour, very bitter, and affording, when pulverized, a grayish powder, tinged with red. The odour is slight, and the taste astringent and slightly aromatic. A chemical investigation was made of this bark some years since by Dr. Walker (*Inaug. Diss.*), but it was very imperfect; it has since been examined by Mr. J. Cockburn, who found it to contain Tannin, Gallic acid, Resin, a Bitter extractive, a Crystalline substance, &c. (*Am. Jour. Phar.* i. 1114.) In the interval between these examinations, it was announced that a peculiar principle, to which the name of *cornine* was given, had been obtained from the bark, but the process was not published, nor has it been detected by subsequent experimenters. It was exhibited by Dr. S. G. Morton, in some cases of intermittent fever, with much success; he describes it as a grayish-white

powder, extremely bitter and deliquescent, when exposed to the air. (*Phil. Jour. Med. and Phys. Sci.* xl.) Mr. Ellis states (*l. c.*) that Dr. S. Jackson, lately of Northumberland, in this state, informed him that he had subjected the bark to Henry's process for obtaining quinia from Cinchona, and that without carrying the process so far as to obtain a crystalline salt, he used the concentrated alcoholic solution with the most decisive results, and was satisfied that it contained a principle analogous to quinia.

Medical Properties.—This bark is tonic, astringent, and somewhat stimulant in its action, and from the testimony of numerous practitioners, who have given it an extended trial, is the best native substitute for the Cinchona, and in some cases has succeeded where this substance was found ineffectual in preventing the return of paroxysmal fevers. But it would also appear that it is more apt to disorder the stomach, especially when used in a recent state; in some cases, also, it has produced pain in the bowels, which, however, was readily relieved by a few drops of laudanum. On the whole, it may be considered as a useful tonic, and one that may be employed with advantage, where good Peruvian bark or its preparations cannot be procured, or where they fail in inducing the desired result. The dose in powder is from twenty to thirty grains, to be repeated according to circumstances. It may also be given in decoction, made with an ounce of the bark to the pint of water, of which the dose is from an ounce to two ounces.

The ripe berries, infused in brandy, are used in some parts of the country as bitters; and an infusion of the flowers forms a very good substitute for chamomile tea. Dr. B. S. Barton (*Collections*, 12) says that a decoction of the bark was found very useful in a malignant disorder of horses, called "yellow water," &c. From the presence of gallic acid in it, a good writing ink may be made from it.

2. C. SERICEA, *Linn.*—Branches spreading, reddish; branchlets, cymes, and petioles, woolly. Leaves ovate or elliptical, acuminate, nearly glabrous above, pubescent beneath. Cymes depressed, crowded. Calyx teeth lanceolate. Petals lanceolate-oblong, obtuse. Drupes sub-globose, pale blue.

Linn., *Sp. Pl.* 663; Torrey and Gray, *Fl.* i. 651; Barton, *Veg. Mat. Med.* i. 115; L'Heritier, *Corn.* No. vi. t. 2.

Common Names.—Red Willow; Rose Willow; Swamp Dogwood, &c.

Description.—A shrub from six to ten feet high, with a greenish or brownish-purple bark, which is of a brighter colour on the younger shoots. The leaves are pale-green, ovate, and acuminate, sometimes almost lanceolate, at others broadly ovate; at first somewhat lanuginous, but finally nearly glabrous, except the veins beneath; pubescence soft, whitish, or rust-coloured. Flowers in large terminal cymes, without an involucrum, of a yellowish-white colour. Stigma thick and capitate. The berries are globular, of a beautiful blue colour.

This species, like the last, has a wide range in the United States, and is found in wet thickets, and on the margins of water-courses. It flowers in June and July, and ripens its fruit in September. The bark of the root, which is to be preferred, much resembles that of the last species, and possesses the same properties, but is less bitter and more astringent, and is given in the same doses. The young shoots are used to make coarse baskets; and the bark of them formed a favourite admixture with tobacco for smoking by the Indians, who also, according to Dr. B. S. Barton, extracted a scarlet dye from that of the small roots.

3. C. CIRCINATA, *L'Heritier.*—Branches greenish, spotted, verrucose. Leaves large, broadly ovate, or roundish, abruptly acuminate, tomentose beneath. Cymes rather small, depressed. Drupes ovoid-globose, light-blue.

L'Heritier, *Corn.* 9; Torrey and Gray, *Fl.* i. 650.
Common Names.—Broad-leaved Dogwood; Alder-leaved Dogwood.

Description.—A shrub from four to eight feet high, with straight, slender branches, which are greenish and verrucose. The leaves are large and rounded, and are somewhat rough above, but lanuginous beneath. The flowers are in small, depressed cymes, without an involucrum. The berries are a bright-blue, becoming lighter-coloured as they mature, small, and crowded with the persistent style.

This species occurs in the same situations as the last, but is far from being as abundant; it is more common in the Eastern States than further South. The bark, when dried, is in quills of a whitish or ash colour, and affords a gray powder. Its odour is slight, and its taste bitter, astringent, and somewhat aromatic. It is possessed of the same properties, and probably the same composition, as the *C. florida*, and is much employed in some of the New England States. Drs. E. and A. Ives speak of it in the highest terms as a tonic and astringent, especially in the form of an infusion. The extract also, 150 grains of which are afforded by an ounce of the bark, is an eligible preparation; it is astringent, and intensely bitter.

Although no trials have been made of the barks of the other native shrubby species, as the *C. alternifolia*, *stricta*, &c., it is most probable that they all possess analogous qualities, as do also those of Europe, the *C. mas* and *C. sanguinea;* the berries of the latter also furnish an oil resembling that of the olive; M. Murion (*Jour. de Pharm.* x.) states that they afford one-third of their weight, of a pure and limpid oil, fit for the table or for burning. As the berries of this species closely resemble those of some of the native species, it is likely that these might also be used for this purpose. The berries of *C. mas* are used in Turkey for making a kind of sherbet.

Order 56.—HAMAMELIDACEÆ.—*Lindley.*

Calyx adherent, in 4—5 pieces. Petals when present 4—5, with an imbricated æstivation. Stamens 8, of which 4 are alternate with the petals; anthers introrse, 2-celled; 4 sterile at the base of the petals. Ovary 2-celled, inferior. Ovules single or several, pendulous or suspended. Styles 2. Fruit semi-inferior, capsular, usually opening with 2 valves. Seeds pendulous. Embryo in the midst of fleshy or horny albumen.

A small order of small trees or shrubs, with alternate, dentate leaves with the veins running from the midrib straight to the margin. Flowers small, axillary, sometimes unisexual by abortion. The species are found in North America, China, Central Asia, and South Africa; but one of them has been used medicinally.

Hamamelis.—*Linn.*

Calyx 4-celled, persistent, 2—3 bracteolate at base. Petals 4, long, ligulate, with 4 sterile stamens at base. Fertile stamens 4, alternate with the petals. Anthers introrse, 2-celled; each cell with an operculate valve. Styles 2, short. Capsule coriaceous, or bony, 2-celled, 2-lobed; apex 2-valved, valves cleft. Seeds 2, arillate.

A genus of a few species, found in North America and China; they are large shrubs and usually flower in the autumn after the leaves have fallen, and perfect their fruit the following year.

H. VIRGINIANA, *Linn.*—Leaves obovate, obtuse, with a sinuate-crenate margin, obliquely subcordate at base; scabrous with minute elevated spots beneath. Calyx and fruit pubescent.

Pursh., *Fl. Am.* i. 116; Barton, *Fl. N. A.*, t. 78; Darlington, *Fl. Cest.* 114; Rafinesque, *Med. Fl.* i. 227.

Common Names.—Witch Hazel; Winter Bloom, &c.

Description.—A shrub from six to twelve feet high, with flexuous branches, and a smooth gray bark. Leaves on short petioles, alternate, obovate, unequally subcordate at base, margin sinuate-crenate. Flowers on short pedicels, in small clusters. Calyx small, with four thick, oval, pubescent segments, and having two or three small bracts at base. Petals four, yellow, ligulate, a little crisped. Stamens four, fertile, alternate with the petals, and four sterile at their base. Ovary ovate, with two short styles, crowned by obtuse stigmas. Fruit a nut-like capsule, bilobate and split above, yellowish, pubescent, with two cells, each containing an oblong black seed, which are dispersed by the elastic valves of the capsule opening rapidly.

Fig. 165.

H. Virginica.

This shrub is found in most parts of the United States, and presents several varieties, which have been considered as species by Walter, Pursh, and others. The flowers are generally polygamous, and the female flowers often apetalous. The shoots are used as divining rods to discover water and metals under ground, by certain adepts in the occult arts. The bark and leaves are bitter and astringent, leaving a sweetish taste in the mouth. The odour is pleasant and somewhat aromatic. No analysis has been made of them.

Medical Uses, &c.—It is said to be sedative, astringent and tonic, and was much employed by the Indians, and is in use in some parts of the country in domestic practice. The bark is applied to painful tumours and external inflammations, chronic ophthalmia, &c., in the form of a decoction or cataplasm. A tea of the leaves is used as an astringent in bowel affections, and hæmorrhages. This article seems to have some peculiar powers, and deserves a careful investigation.

Sub-Class II.—Monopetalous Exogenous Plants.

Floral envelopes consisting of both calyx and corolla; the petals more or less united or gamopetalous.

Group XXIII.—Cinchonales.

ORDER 57.—CAPRIFOLIACEÆ.—*Jussieu.*

Tube of the calyx adherent to the ovary. Margin 5-parted. Corolla tubular or rotate. Lobes imbricate in æstivation. Stamens equal in number and alternate with the lobes of the corolla, and inserted into the tube. Anthers introrse, versatile. Ovary 3 (or 4—5) celled, with one to several pendulous ovules in each cell. Style filiform, with a somewhat capitate stigma, or wanting. Stigmas 1—4. Fruit baccate, fleshy, or sometimes dry, sometimes 1-celled by abortion. Seeds anatropous. Embryo in the axis of the fleshy albumen.

Fig. 166.

Caprifolium perfoliatum.

a Insertion of stamens. *b* Anthers. *c* Section of ovary. *d*. Fruit. *e*. Section of do. *f*. Seed. *g*. Section of do. *h*. Embryo.

This order presents great variations in the inflorescence, and will perhaps be divided; the several tribes now composing it differ from each other in many important particulars. The species are generally shrubs, but in a few instances are herbaceous; they are chiefly natives of cold and temperate climates, and when occurring in tropical regions are confined to the mountains.

Triosteum.—*Linn.*

Calyx 5-cleft, persistent, nearly as long as the corolla. Segments linear, lanceolate. Corolla tubular, 5-lobed, subequal, base gibbous. Stamens 5, included. Ovary 3 (rarely 4—5) celled, with a single suspended ovule in each cell; style included; stigma somewhat lobed, capitate. Fruit drupaceous, somewhat dry, 3-celled, 3-seeded.

This genus is Asiatic and North American, two species being peculiar to each country; they are perennial herbaceous plants, with lanceolate or ovate entire leaves, narrowed and somewhat coronate at base, and axillary almost sessile flowers, which are solitary or clustered.

T. perfoliatum, *Linn.*—Stem hirsute; leaves ovate-acuminate, narrowed at base, pubescent beneath, hairy above; flowers sessile, clustered.

Linn., *Sp. Pl.* 250; Torrey and Gray, *Fl.* ii. 12; Barton, *Veg. Mat. Med.* i. 59; Bigelow, *Med. Bot.* i. 90.

Common Names.—Fever-wort; Wild Coffee; Horse Gentian; Dr. Tinker's weed.

Description.—Root perennial, horizontal, thick and fleshy. Stem from two to four feet high, simple, erect, pubescent. Leaves large, oblong-oval, acuminate, narrowed towards the base, mostly connate, upper ones almost amplexicaul. Beneath they are covered with a bluish-white pubescence, and above sparsely so, or almost glabrous. The flowers are axillary, sessile, clustered. The calyx is composed of five linear segments of a purplish colour, with a single bract. The corolla is rather longer than the calyx, tubular, five-lobed, lobes rounded, the lower part of the tube is gibbous. The stamens are five, included, with hairy filaments. The ovary is inferior and supports a long, slender style, with an oblong stigma. The fruit is ovate, of an orange-colour (Torrey and Gray; dark-purple, Barton, Pursh, &c.), crowned with the persistent calyx, three-celled, each cell containing a hard seed.

The Fever-wort is found in shady, rocky situations, in rich soil, in many parts of the United States, flowering in June and July. The root is the officinal part; it is from half an inch to three-quarters of an inch in diameter, of

a yellowish or brownish colour externally, whitish within. When dry, it is brittle and readily pulverized. The odour is nauseous, and the taste bitter and unpleasant. Its active principles are given up both to water and alcohol and are retained in the extract. No analysis has been made of it.

Medical Properties.—It is a mild cathartic and sometimes operates as an emetic, especially when the fresh root is given, or when the dried root is administered in large doses. The extract, which is the best mode of exhibiting it, purges in doses of from ten to fifteen grains. Five pounds of the root are said to afford two pounds of extract. The dose of the powder is a scruple to half a drachm. It may be used in all cases where it is wished to act gently on the bowels, either alone or in combination with calomel. Rafinesque states that the leaves are diaphoretic.

The hard seeds, according to Dr. Muhlenberg, have been used as a substitute for coffee, and when properly prepared are said to be a very excellent one. There is another native species peculiar to the Southern States, with narrower leaves, *T. angustifolium*, which possesses the same qualities as the above, and was perhaps used medicinally before the other, as Plukenet received it under the name of *Dr. Tinker's weed*, derived from the empiric who first brought it into notice.

Sambucus.—*Linn.*

Limb of the calyx small, 5-cleft. Corolla rotate or urceolate, 5-cleft, segments obtuse. Stamens 5. Fruit baccate, pulpy, subglobose, 3-seeded. Styles 3.

Shrubs or small trees with opposite leaves, which are simply or doubly pseudo-pinnate, in a few species bi-stipulate, in most with two glands at the base of each pair of leaflets. Flowers in compound, fastigiate cymes of a white or reddish colour.

S. nigra, *Linn.*—Cymes five-parted. Leaves pinnate; leaflets ovate, serrated. Stem arborescent.

Linn., *Sp. Pl.* 395; Woodville, iii. 596; Stephenson and Churchill, ii. 79; Lindley, *Fl. Med.* 446.

Common Names.—Common Elder; English Elder; Bourtree.

Foreign Names.—Sureau, *Fr.;* Sambuco, *It.;* Gemeiner Hohlunder, *Ger.*

Description.—Stem much and irregularly though always oppositely-branched; younger branches smooth, containing much light spongy pith. Leaves long, composed of two pair and an odd terminal leaflet, of a shining green colour, acuminated, serrated, and smooth. The flowers are numerous, cream-coloured, and form large cymes, which are quinque-partite; the calyx is persistent, 5-cleft; the corolla rotate, also 5-cleft, the segments being obtuse and somewhat reflexed. The stamens are five, subulate, as long as the corolla, and furnished with roundish, cordate, yellow anthers. The ovary is ovate, supporting three obtuse stigmas. The fruit is a globular berry, of a purplish-black colour on a reddish footstalk.

This species of Elder is indigenous to many parts of Europe, growing in the same situations as those in which our native kind is found. The parts used in medicine are the inner bark, which is greenish-white, of but little odour and a sweetish mucilaginous taste; the flowers, which have an oppressive sickly odour; and the berries, which are inodorous, of a sweet taste, and yield a purple juice, which is a delicate test for alkalies and acids. The bark does not appear to have been analyzed, but the flowers, according to Eliason (*Pereira*, ii. 473), contain a Volatile oil, Acrid resin, Tannin, Extractive, &c.; the berries contain Malic and a little Citric acids, Sugar, Pectin, and Colouring matter.

Medical Properties.—The inner bark of the Elder was used by the ancients as an aperient and deobstruent, and has also been praised for these properties by Boerhaave and Sydenham, especially in the treatment of dropsies, and is

still used in domestic practice in England, though seldom employed by physicians. Its action, both as an emetic and purgative, is sometimes so violent as to produce inflammation of the bowels. The leaves and young buds are also purgative. The flowers, which Linnæus states are poisonous to peacocks, were formerly administered in the form of infusion, as a diaphoretic in many diseases, but are disused except for the purpose of making elder flower water and elder ointment, the first principally being employed as a perfume, and the latter as a cooling and soothing application to ulcers, burns, &c. The berries furnish a juice which when diluted with water is a cooling and laxative drink in febrile complaints. The principal employment is, however, in the preparation of a wine, which, when well made, is an excellent cordial. The dose of the bark is from ten grains to half a drachm, or half an ounce may be boiled in a pint and a half of water down to a pint, and taken at three equal doses.

Another European species, the *S. ebulus*, is still more violent in its operation on the system than the above, and may be ranked as one of the acrid poisons. The juice of the berries is also purgative, and is used for that purpose in Switzerland and other parts of Europe. The berries of a native species, the *S. canadensis*, are officinal in the U. S. Pharmacopœia; they are used for the same purposes as those of the *S. nigra*, and the other parts of the plant are employed in domestic practice in the same way as those of the foreign article.

Order 58.—CINCHONACEÆ.—*Lindley.*

Calyx adherent, with a definite number of divisions, or none. Corolla superior, regular, tubular, divisions definite; æstivation valvate or imbricate. Stamens inserted on the corolla, and alternate with its lobes. Ovary inferior, crowned with a disk, usually 2-celled, sometimes with several. Ovules numerous, attached to a central placenta, or few and erect, or ascending. Style single, sometimes partly divided. Stigma commonly simple, occasionally divided. Fruit inferior, either dividing into two cocci, or indehiscent and dry or succulent, sometimes with several cells. Seeds definite or numerous. Embryo small, oblong, surrounded by a horny albumen.

A very extensive order of trees, shrubs, or herbs, with simple, entire, opposite, or verticillate leaves, having interpetiolary stipules. Flowers usually in corymbs or panicles. They are principally natives of the warmer climates, but very few being extra-tropical. A great number of them are of much importance in medicine, and are very various in their properties, being tonic, astringent, emetic, purgative, and stimulant; some, again, are poisonous. It would be impossible to notice, even in a brief manner, the variety of plants belonging to this order that have been, and are still employed as therapeutic agents, and therefore those only will be described which occupy a prominent rank.

Section 1. Coffeæ.—Ovary with only one or two seeds in each cell.

Richardsonia.—*Kunth.*

Tube of calyx sub-globose; limb 4—7-parted. Corolla infundibuliform, 3—5-parted, with a valvate æstivation. Stamens as many as lobes of corolla, exserted. Styles 3—4-cleft at apex, with sub-capitate stigmas. Capsule crowned by the persistent calyx, 3—4-seeded. Seed peltate, with a fleshy, somewhat corneous albumen.

A genus peculiar to America, consisting of decumbent plants, with subligneous, somewhat simple roots, and opposite, stipulated leaves. The flowers are terminal and quadri-bracteate. The medicinal qualities are those of ipecacuanha. Several species are employed in South America.

R. scabra, *Linn.*—Stem prostrate or erect, pilose. Leaves ovate, or oblong-ovate, narrowed at base, pubescent. Capituli many-flowered.

Linn., (*Richardia,*) *Sp. Pl.* 470; St. Hilaire, *Pl. usuelles, Bras.* t. 8; Martius, *Spec. Mat. Med. Bras.* 10.

Common Names.—Undulated Ipecacuanha; White Ipecacuanha.

Fig. 167.

R. scabra.

Description.—Stem decumbent, pilose, much branched. Leaves ovate or ovate-lanceolate, with their margins scabrous, and furnished with short, setaceous stipules. The flowers are in capituli at the ends of the branches. The lobes of the calyx are triangular, and those of the corolla are pilose at their apex.

Fig. 168.

Roots of Richardsonia.
a. R. scabra.
b. R. emetica?

It is found in many parts of Brazil, in sandy, dry situations, flowering during nearly the whole year. The root is from four to eight inches long, annulated, or subannulated by transverse depressions, and having longitudinal furrows or striæ. Epidermis in the recent root whitish; in the dry, grayish, or pale-fulvous, smooth. Cortical portion soft, white, farinaceous, friable, with an acrid, and somewhat nauseous taste and smell. Ligneous part pale-yellow, inodorous, and insipid. An analysis of it, by Pelletier, shows it to contain only about six per cent. of emetine. It was for some time supposed that the white ipecacuanha was the product of a *Viola*, until Dr. Gomez proved that it was derived from one or more species of the present genus. M. Guibourt has proposed to call it *undulated* Ipecacuanha, as it is rather undulated than annulated; or, in other words, the depression on one side of the root corresponds to the elevation on the other.

Medical Properties.—It is a very mild emetic, of the same character as Ipecacuanha, and is much esteemed in Brazil, but is not used in Europe or this country. From the experiments made with it by Dr. Gomez, he found that it required from one to two drachms of the powder to produce its full effects.

Two or three other species are also used, one of which, the *R. rosea*, or, as it is called by the natives, *Poayo do campo*, closely resembles the true Ipecacuanha both in appearance, sensible properties, and doses, and is said to be the best substitute for it.

Cephalanthus.—*Linn.*

Calyx tube obpyramidal, limb 4-toothed. Corolla tubular, slender, four-cleft, lobes erect, with a valvate æstivation. Stamens 4, somewhat exserted. Style filiform, very long, with a capitate stigma. Fruit inversely pyramidal, coriaceous, 2—4-celled, nearly bipartite, and each cell nearly bivalve and one-seeded. Seeds with a rind or corky arillus.

A small genus of shrubs with oval or lanceolate, opposite or ternate leaves, furnished with short, distinct, or somewhat united stipules. The flowers are densely congregated in a globose head, on a terminal or axillary peduncle. The species are all American, if the genus be restricted to the two-seeded, which has been done by Richard, and others.

C. occidentalis, *Linn.*—Leaves opposite and ternate, glabrous, ovate, or oblong-oval, acuminate, petiolated; peduncles longer than the heads, often ternate at the extremity of the branches.

Linn., *Sp. Pl.* 138; Torrey and Gray, *Fl.* ii. 31; Barton, *Fl. Am. Sep.* iii. t. 91; Rafinesque, *Med. Flor.* i. 100.

Common Names.—Button Bush, Pond Dogwood, Globe Flower, &c.

Foreign Names.—Bois de Marais, *Fr.;* Scabiosa Americana, *It.;* Americanische weissbau, *Ger.*

Fig. 169.

C. occidentalis.

Description.—A shrub from three to fifteen feet high, much branched, bark smooth on the branches, rough on the stems. Leaves opposite or ternate, with red petioles, oval, base acute, apex acuminate, margin sometimes undulate, smooth on both sides, or sometimes more or less pubescent. The flowers are terminal, forming round balls of a cream-white colour, about an inch in diameter, on peduncles of two inches long. Calyx tube produced above the ovary, teeth obtuse, persistent. Corolla with a somewhat funnel-shaped tube, with four ovate segments. Stamens not much longer than the corolla, with yellow anthers. Style filiform, much exserted, with a yellow stigma. Capsules small, crowded, formed of two half bivalve cells, with the valves opposite, each containing one seed.

The Button-bush is found in most parts of the United States, in low, wet situations, or on the banks of streams and ponds. There are several varieties, as regards the size and pubescence of the leaves. It flowers in July and August, and has a peculiar and heavy odour. The wood is light and spongy. The whole plant is bitter, but this quality is most developed in the bark of the root. This, when dried, somewhat resembles Cascarilla in ap-

pearance and qualities. It has never been analyzed, but contains some volatile oil, and much bitter extractive.

Medical Properties.—These have not been well ascertained, though enough is known to say that the bark is tonic, with some aperient qualities. It was in use by the southern aborigines; and is a domestic remedy in Louisiana, where it is considered useful in intermittents. Dr. Elliott says "the inner bark of the root is an agreeable bitter, and frequently used as a remedy in obstinate coughs." It has attracted but little attention from the profession, but deserves a trial as to its real powers.

CEPHAËLIS.—*Swartz.*

Calyx tube obovate, limb very short, 5-toothed. Corolla somewhat infundibuliform, five-parted, segments obtuse, anthers included. Stigma bifid, often exserted. Fruit an ovate-oblong berry, crowned with the remains of the calyx, 2-celled, 2-seeded.

An extensive genus of American plants, composed of shrubs and herbs with ovate, acute, petiolate leaves, furnished with stipules which are free, or connected, or bi-dentate. The flowers are in terminal or axillary capituli, either pedunculated or sessile, furnished with 2—8 involucrate bracts, and with bracteoles between the flowers. Many of the species are imperfectly known, and it is possible that several of them do not properly belong to this genus. One only of them has been used in medicine, though from the uniformity of character among the herbaceous species it is very likely that they may all possess similar properties.

C. IPECACUANHA, *Richard.*—Stem ascending, at last erect, somewhat pubescent towards the top. Leaves oblong-ovate, rough above, finely pubescent beneath. Stipules divided into setaceous segments. Heads terminal, erect, at length pendulous. Bracts four, somewhat cordate.

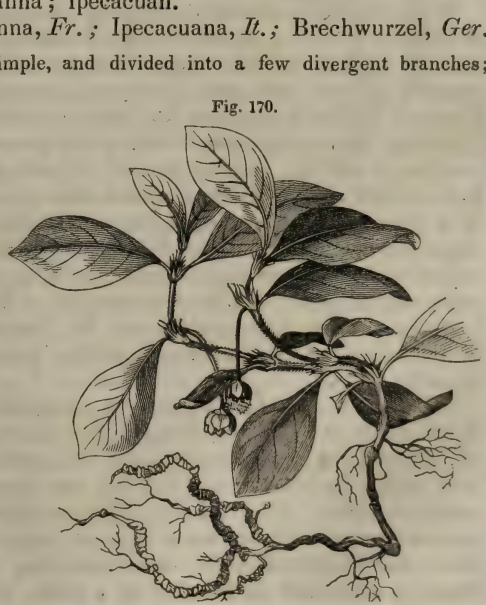
Richard, *Bull. Med.* iv. 92; Martius, *Mat. Med. Bras.* v. t. 1; Stephenson and Churchill, i. 62; Lindley, *Fl. Med.* 442; *Callicocca ipecacuanha*, Brotero, *Trans. Linn. Soc.* vi. 137.

Common Names.—Ipecacuanha; Ipecacuan.

Foreign Names.—Ipecacuanna, *Fr.*; Ipecacuana, *It.*; Brechwurzel, *Ger.*

Description.—Root perennial, simple, and divided into a few divergent branches; flexuose, contorted, entering the earth obliquely, from four to six inches long, about the thickness of a quill, much thinner towards the base and apex, annulated; epidermous, glabrous, of a pale fuscous in the recent root, and umber or blackish-brown in the dry; the cortex is soft, white, and sub-amylaceous in the fresh root, and pale reddish or rose-coloured in the dried state, of a shining and resinous fracture, and readily separable from the thin, central, ligneous fibre-stem, suffruticose, from two to three feet long, every where nodose, sending off roots at the knots. Leaves four to six, rarely more, oblong-ovate, petiolate; leaves at the top of the stem opposite, those towards the base alternate. Stipules erect four to six-cleft, deciduous. Flowers in semi-

Fig. 170.



C. ipecacuanha.

globose heads, surrounded by an involucrum. Calyx adhering to the ovary, small, obovate, whitish. Corolla white, funnel-shaped, five-cleft. Fruit ovate, obtuse, at first purple, afterwards violet-black, containing two seeds.

It is found in various parts of Brazil, but is most abundant between the 8th and 20th degree of south latitude. It flowers in January and February, and ripens its fruit in May. The root forms a very valuable export from Brazil. It is principally collected by the Indians, who, during the two months in which it is gathered, leave their villages almost deserted, and dwell in the forests in which it is found; the consequence is, that it is almost extirpated in many spots formerly abounding with it. The plants are pulled up, the roots separated from the stem, washed clean, and tied in small parcels, for the purpose of drying. This is done in January and February, or during the flowering season, thus giving the plant no chance of increasing by seed.

The first account of this article was given by Michael Tristan, a native of Brazil. He speaks of it as a remedy in dysentery in the following terms: "*Igpecaya* or *Pigaya* is profitable for the bloodie fluxe; the stalke is a quarter long, and the roots another or more; it hath onely foure or five leaves; it smelleth much wheresoever it is, but the smell is strong and terrible. This root is beaten and put in water all night at the draw, and in the morning, if this water with the same root be beaten and strained, be drunk (onely the water), it causeth presently to purge in such sort that the taske ceaseth altogether." (*Purchas' Pilgrimes*, iv. 1311). It was a few years afterwards noticed by Piso, (*Hist. Nat. Bras.* 101,) in 1648; he says that it was emetic, and considered as a specific in diseases of the bowels; his description of it, however, was very imperfect, and it was not until 1672 that it was introduced into Europe, when a French physician by the name of Legras, brought a quantity from South America, and sold it under the name of *Mine d'or*. From having been improperly given, or being deteriorated, it was esteemed as of little value, and it was owing to mere accident that it was again brought into notice by Helvetius.

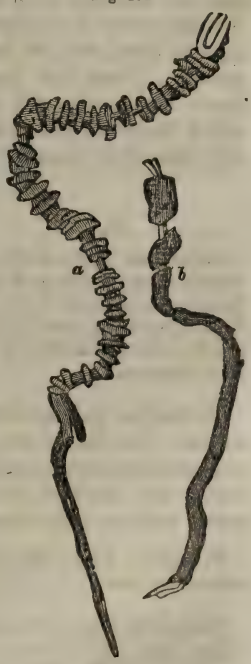
Whilst he was a student at Paris he accompanied a physician by the name of Afforty, to visit a merchant named Grenier; this latter having recovered from his disease, testified his gratitude by making Afforty a present of a portion of a valuable remedy in dysentery, that had been sent to him from South America. Afforty attaching but little importance to the gift, transferred it to Helvetius, who experimented with it on several persons affected with bowel complaints and was very successful. Finding that the virtues of the article had not been exaggerated, he published to the world that he was in possession of a certain remedy in dysentery, carefully concealing what it was. But several of the attendants on Louis XIV., and finally the dauphin being attacked with the prevailing disorder, the king ordered an arrangement to be made with Helvetius for the promulgation of his secret. This was done, and a thousand louis d'ors paid him for it. Its use now became general, and it was universally looked upon as a perfect panacea in all complaints of the digestive organs.

This increased demand caused a variety of different roots, all known in Brazil under the name of *Poaya*, to be sent to Europe, until the appellation of Ipecacuanha was bestowed upon all roots of American origin, endowed with emetic properties; but nothing was known with regard to the plants producing them. Until the time of Linnæus it was generally thought that Ipecacuanha was furnished by a kind of violet. About the year 1724, however, the celebrated Mutis, then travelling in New Granada, sent to the Swedish naturalist an account of a plant, which he supposed to be that no-

ticed by Piso. A description was published of it by the younger Linnæus in the Supplement to the Species Plantarum under the name of *Psychotria emetica*. This was considered satisfactory until the beginning of the present century, when Brotero pointed out the real origin of this useful root, and described and figured the plant in the Transactions of the Linnean Society of London, vol. vi., under the name *Callicocca ipecacuanha;* at a more recent period, Richard, (*Bull. Med. Par.* iv. 92,) finding that it did not agree in character with that genus, removed it to that of *Cephaëlis* of *Swartz*, and this change has been recognised by most succeeding botanists.

Notwithstanding this, much uncertainty still existed as regarded other roots, also derived from Brazil, and bearing the same name. In 1802, De Candolle published a memoir in which he proved that the Ipecacuanhas of commerce were not only derived from the plants described by Mutis and Brotero, but also from others of different and widely-separated genera. This has since been fully corroborated by A. St. Hilaire, in his work on the plants of Brazil, by Richard, and in a still more ample manner by Dr. Martius, in his *Specimen. Mat. Med. Brazil.* The Ipecacuanhas may be divided into two classes, the *annulated* or true, and the *striated* or false. The latter of these will be found noticed under *Ionidium, Psychotria, Richardsonia*, &c. The true, as imported into this country, where, it may be mentioned, very little of the false is sent, is in pieces about the size of a quill, of an irregular, twisted, and contorted shape, and apparently formed of small, unequal annular rugæ or rings, of about a line in height, separated by narrow interstices. When broken, they present two distinct parts, a thin ligneous axis or centre, and a thick cortical layer of a brownish colour, and resinous fracture, having an herbaceous, acrid, and somewhat bitter taste, with a slightly nauseous odour. The epidermis presents several varieties of colour, to which some importance has been attached by pharmacologists, but these differences do not appear to extend to the qualities of the roots, and according to Martius arise from the respective ages of the roots and the mode of drying. The principal of these varieties are the *Brown*, the *Gray*, and the *Red*, of which the first is the most common and the most esteemed; the gray is very rare, and the red is far from common, at least in this country, though specimens can always be found among the bales of the brown. The variety noticed by Dr. Pereira (fig. *b*), which is not annulated, but slightly warty, is to be found in all the parcels of roots that come to this market. According to the analysis of Pelletier, the cortical portion contains 16 per cent. of a peculiar principle, which is the active ingredient, and called *Emetin*, with a large proportion of starch, gum, &c.; a more recent analysis, by Bucholz, of the whole root, only afforded him little more than four per cent. of Emetin; this can only be accounted for by the latter operating on roots that had become deteriorated. Pure emetin will cause vomiting in doses of one-sixteenth of a grain.

Fig. 171.



Roots of C. ipecacuanha.
a Ringed portion. *b* Portion without rings.

Medical Properties.—The medical effects of Ipecacuanha differ according to the mode of administration. When given in small and repeated doses, it

principally acts on the secreting organs, especially those of respiration, promoting expectoration and a restoration of healthy action; when the dose is increased, it displays its powers on the stomach and induces nausea, depression of pulse, or if aided by warmth exerts a diaphoretic influence; when given in full doses, it operates as a certain but mild emetic. By combination with other remedies, these effects are increased; thus when mixed with squills, it acts still more actively as an expectorant, whilst with opium it exerts a much more decided diaphoretic action. From these various properties, it is extensively employed in the treatment of almost every disease, and to fulfil a great diversity of indications. There is one effect of this article that deserves notice, which is its irritant effect on the respiratory passages of many persons, bringing on an attack resembling asthma; some individuals are so susceptible to its influence that the mere odour of it will cause difficulty of breathing. It has been said, that ipecacuanha was first introduced as a remedy in bowel diseases, and that it proved eminently successful in such cases; but at present, it is seldom resorted to in their treatment, except in conjunction with opium, and its whole benefit is then attributable to its diaphoretic action. Some late writers have, however, used it with advantage in large doses, in conjunction with some of the bitters or with opium, at the commencement of an attack of dysentery, and it is said with advantage. The dose of ipecacuanha as an emetic, is about fifteen to twenty grains, though a much smaller quantity will often suffice; it has one advantage, that an increase of dose does not act injuriously on the patient, as it is brought away at the first discharge from the stomach. As a nauseant the dose is from two to four grains, and as an expectorant from one to two grains. There are many preparations of this drug, none of which are much employed, with the exception of the compound or Dover's Powder, which is one of the most valuable medicines in the Materia Medica, where it is wished to produce diaphoresis.

Psychotria.—*Linn.*

Calyx tube ovate; limb short, 5-lobed, 5-toothed or entire. Corolla infundibuliform, usually short, 5-, rarely 4-cleft, regular; limb spreading or recurved; æstivation valvate. Stamens five, rarely four; anthers exserted or included; style simple; stigma 2-cleft. Fruit drupaceous, containing 2 mucules, crowned with the limb of the calyx, and ribbed; mucules coriaceous, ribbed, angled or even, 1-seeded. Seed erect, with a cartilaginous, solid albumen.

A tropical genus, composed principally of trees and shrubs, rarely herbaceous. The leaves are opposite and petiolated. The flowers in panicles or corymbs on terminal peduncles. The number of species is very great, being nearly two hundred, but they require careful revision, as much uncertainty exists with regard to many of them.

P. emetica, *Linn.*—Stem herbaceous, procumbent; leaves lanceolate, smooth; stipules setaceous; flowers in axillary capituli, peduncles few-flowered.

Linn., *Supp.* 144; Humboldt and Bonpland, *Pl. Æq.*, ii. 142; Martius, *Spec. Mat. Med. Bras.*; Lindley, *Fl. Med.* 440.

Common Names.—Striated Ipecacuanha; Black Ipecacuanha.

Description.—Root perennial, almost horizontal, cylindrical, about the size of the little finger, with here and there narrow, deep depressions. Stem somewhat ligneous, simple, about a foot to two feet in height, somewhat pubescent. Leaves opposite, lanceolate, on short petioles, and furnished with narrow acute stipules. Flowers white, small, on axillary peduncles.

This plant grows in Peru and Colombia, and probably in other parts of South America. Humboldt found it in great abundance near the Magdalena, but it must be scarce in Brazil, as Martius was unable to detect it among the Ipecacuanha sent for exportation to Bahia and other ports. It is seldom or never brought to this country or Europe, though it enjoys a high reputation in South America. As met with in the dried state, it is in pieces about the size of a large goose-quill, less twisted than those of the true Ipecacuanha, but striated longitudinally, and presenting at intervals deep circular depressions. The fracture is brownish, slightly resinous; the odour is very feeble and the taste somewhat bitter but insipid. The epidermis is of a dirty reddish-gray colour, becoming blackish by age. The cortical portion is soft, and the ligneous part is yellowish, perforated by an infinite number of minute holes. From an analysis by Pelletier, it has been found to contain nine per cent. of emetine, fatty matter, gum, starch, &c.

Medical Properties.—These are the same as those of the Ipecacuanha, and it is administered in the same manner.

Fig. 172.

Roots of P. emetica.
a. Old root. *b*. Contorted do.

COFFEA.—*Linn.*

Tube of the calyx ovate, globose or turbinate; limb small, 4—5-toothed. Corolla infundibuliform, with a dilated 4—5-parted limb with oblong lobes. Stamens 4—5, included or exserted. Style bifid at apex. Berry umbilicated, naked, or crowned, 2-seeded. Seed convex above, flat beneath, with a longitudinal furrow.

This genus is a large one, and consists of shrubs or trees with opposite leaves, furnished with stipules. Many of the species included in it are wholly distinct in their characters, and belong to other genera, and a further examination will possibly restrict it to those noticed by De Candolle in his first section of it. The Coffee of commerce is derived from more than one species, or at least from several strongly-marked varieties.

C. ARABICA, *Linn.*—Leaves oblong, ovate, acuminate. Peduncles axillary, aggregate. Corolla 5-cleft. Stamens exserted; berry ovate.

Linn., *Sp. Pl.* 245; *Bot. Mag.* 1303; De Candolle, *Prod.* iv. 499; Lindley, *Fl. Med.* 440.

Common Names.—Coffee tree; Arabian Coffee tree.

Foreign Names.—Caffayer Arabique, *Fr.*; Caffé di Moca, *It.*; Arabische Kafferbaum, *Ger.*

Description.—An evergreen shrub from ten to twenty feet high, with an erect stem, covered with a brownish bark. The branches are opposite, as are also the leaves, which are ovate-lanceolate, acuminate, entire, smooth, shining, bright green above, and paler beneath, on short petioles. The flowers are white, odorous, sessile, in clusters of four or five together, in the axils of the leaves. The calyx is superior, small, 5-toothed. The corolla is funnel-shaped and divided into five lanceolate, spreading segments. The stamens are inserted into the tube of the corolla, and have yellow, linear anthers. The ovary is inferior, ovate, and supports a simple style, with two awl-shaped, re-

Fig. 173.

C. arabica.

a. Corolla and stamens. *b*. Pistil. *c*. Berry. *d*, *e*. Sections of the same. *f*. Embryo.

flexed stigmas. The berry is globular, about the size of a cherry, umbilicated at the summit, 2-celled, and containing a somewhat gelatinous pulp. The seeds are hemispherical, convex on one side and flat on the other, longitudinally furrowed, of a pale glaucous colour, and invested in a thin, elastic, somewhat translucent arillus.

The Coffee tree is usually considered to be a native of Arabia, but Bruce states that as it derives its name from Caffee in Africa, where it still grows spontaneously, it was probably originally from thence. Ainslie says that it is a native of Yemen. It certainly was unknown to the Greeks and Romans, nor is there any allusion to it in the Bible, which would be the case, were it known at the times at which its various books were written. It is said to have been first used in Persia, whence the custom was introduced into Arabia, about the time of the Hegira (622). The progress it made was very slow at first, as it was not until 1554 that coffee was publicly sold in Constantinople. Much uncertainty prevails with respect to the time of its introduction into western Europe, though it is probable that the Venetians, who had an extensive commerce with Turkey, were the first to employ it, as late however as 1615. Peter de Valle speaks of bringing home to Italy some coffee, which he says was unknown in his own country. Thirty years afterwards it was introduced into Marseilles, and about 1671 a coffee-house was established in that city, but these establishments were of earlier date in London, as one was opened by a Greek in 1652, and in 1660 a tax of fourpence a gallon was laid on all coffee made and sold, showing that its use had become very general. But the berries were imported into every part of Europe, and were become an article of trade, long before it was known what plant produced them. Prosper Albinus had seen the tree in Egypt, but without fructification (*Aegypt.*, 1592), but the first definite account of it was published by A. de Jussieu, in 1713, (*Mem. Acad. Roy.*) The plant itself was brought to Europe from Batavia to Amsterdam, in 1690 (*Index Plant. Hort. Lug.*), and from the progeny of this single plant not only was the supply obtained

for the botanic gardens of Europe, but all the West India and South American plantations owe their origin to it.

Coffee cannot be cultivated to any advantage where the temperature at any time is below 55°. The trees grow best in virgin soil, on gentle slopes, and where shade can be obtained. They begin to bear when two years old, and the next are in full vigour. The seeds are known to be ripe when the berries assume a dark-red colour, and if not gathered will drop spontaneously. In Arabia they are not gathered, but the trees shaken over cloths laid to receive the berries. These are then spread on mats and exposed to the sun until perfectly dry, when the husk is broken by means of heavy rollers, when the seeds are winnowed and again dried. In the West Indies the berries are gathered by hand; when a sufficient quantity is collected, they are placed in the sun on terraces prepared for the purpose, in layers about four inches thick; a fermentation ensues which destroys the pulp, and in about three weeks they are dried. Another mode is to subject the berries at once to the action of a mill, they are then dried, and then in both cases subjected to appropriate treatment to remove the pellicle, when they are winnowed and put into bags for sale.

The varieties of coffee are very great, no two countries producing an identical article, and even adjoining plantations may differ in their product. These varieties result from soil and climate, aided perhaps by some difference in the mode of cultivation and preparation, as all those in this continent, as before stated, arose from one stock, for it is well known that as late as 1713 a plant was presented to Louis XIV., by the magistrates of Amsterdam. This was placed under the care of Jussieu, and it was not until some years afterwards, that its progeny were carried to the French settlements in America.

When coffee is roasted, a portion is converted into tannin by the action of the heat, and a peculiar and aromatic principle is developed, the precise nature of which has not been ascertained, though it is found to be also evolved on the roasting of other substances, but not to an equal amount. An infusion of unroasted coffee in boiling water is of a yellowish-green colour, but becomes brown if boiled for any time. Both roasted and raw coffee have been repeatedly analyzed, but the results are not satisfactory. It has been shown that the distilled water of coffee contains traces of a volatile oil; some chemists, however, declare that the aroma depends on the volatilization of a peculiar acid, whilst this is denied by others. It is at the same time probable that it does depend on a volatile oil, but of an unknown character. A peculiar principle has been found in coffee, which has been termed *caffein;* this is highly azotized, and is analogous if not identical with those obtained from tea, mate and chocolate, showing a curious identity in principle in the most common beverages of man, though found in the most dissimilar plants.

Medical Properties.—Raw coffee has been used as a substitute for cinchona with some success, but is seldom employed as a remedial agent. When roasted, its nutritive qualities are mostly destroyed, and it becomes more stimulating. A decoction of roasted coffee is powerfully antisoporific, though habit has in many people counteracted this effect. It is considered in India that it allays nervous irritation, and is a powerful anti-emetic (*Ainslie*). Pringle declares that it is the best abater of periodic asthma that he has employed; to be useful it must be made very strong. As a palliative in many forms of headache its powers are well known; it has also been employed as a febrifuge in intermittents, more especially in Italy; as a stomachic in some forms of dyspepsia, though in general in this disease it aggravates the symptoms; as an astringent in diarrhœa, and in a variety of other complaints. Most certainly the abuse of this beverage, when taken in too large quantities and

too strong, will impair digestion instead of promoting it, and in many persons it acts as a powerful stimulant, and if its use be persevered in, occasions disease.

Chiococca.—*Linn.*

Tube of the calyx ovate; limb 5-toothed, persistent. Corolla infundibuliform, 5-lobed. Stamens 5, attached to the base of corolla, included, with linear anthers. Style single, with the apex subclavate or sub-bilobate. Berry small, roundish, compressed, crowned with the persistent calyx; 2-celled, 2-seeded. Seeds pendulous, compressed, roundish.

A small genus of shrubby, somewhat climbing plants, principally found in tropical America, with opposite, ovate, or oblong-acute, smooth leaves, furnished with stipules. The flowers are in opposite, axillary racemes. The general medicinal properties are emetic, purgative, and diuretic.

C. racemosa, *Linn.*—Leaves oval, acuminate. Stipules short, acuminate. Racemes many-flowered; corolla much longer than the calyx. Filaments hairy.

Linn., *Sp. Pl.* 246; Sloan, *Jam.* t. 188, f. 3; Richard, *Elem. Mat. Med.* ii. 331; Torrey and Gray, *Fl.* ii. 31.

Common Names.—Cahinca; Cainca; Snowberry.

Description.—A sub-scandent shrub, somewhat resembling the Jasmine, with opposite branches. Leaves oval, acuminate, or sometimes obtuse, on a short petiole; they are entire, very smooth, and furnished with two short, acuminate stipules, which are connate at their edges. The flowers are in axillary racemes, generally shorter than the leaves; they are usually secund; at first they are white and inodorous, and afterwards yellow and fragrant. The fruit is a small, white, compressed berry. There are several varieties, differing in the form of the leaves, and more or less scandent character of the shrub.

It is a native of the West Indies, South America, and also of the sea-coast of Florida. The officinal portion is the root, which, as found in commerce, is of a reddish-brown colour, and is in cylindrical pieces of various sizes and lengths, somewhat bent and contorted, and wrinkled or striated longitudinally, and also presenting small, irregular asperities. The root is composed of a thin, brown epidermis, covering a thin, brittle, brownish cortex, with an internal ligneous portion, which forms the larger portion of it. The virtues of the root are principally found in the cortical part. This has a disagreeable taste, with some bitterness and astringency, and an unpleasant odour. It has been analyzed by several chemists. Pelletier and Caventou found in it a crystallizable substance, to which the bitterness is owing; a green, fatty matter of a disagreeable smell; a yellow colouring matter, and a coloured, viscid substance. The first of these appears to be the active principle, and has received the name of Cahincic acid.

Medical Properties.—Cahinca is a tonic, diuretic, purgative, and emetic, according to the mode in which it is administered. When it is given in moderate doses, it increases the force of the circulation, and stimulates the bowels and kidneys, though in a gentle manner, and if the patient be kept warm, it will also act as a diaphoretic. In large doses it operates powerfully as an emetic and cathartic. It has long been in use in Brazil as a remedy for the bites of poisonous snakes, though another species is much preferred. Brown (*Jamaica*), speaks of it as resembling Seneka, and very useful in rheumatism, and Ricord Madianna (*Trait. de Mancell.*, 19), also states that it is beneficial in that disease, as well as syphilis, &c. It was first brought into notice by Mr. Langsdorff, the Russian Consul at Rio Janeiro, about the

year 1826, as a remedy in dropsy, since which it has been experimented with, by many practitioners, and especially by Dr. François of Paris, who speaks of it in the highest terms, and considers it superior to any other remedy in this class of diseases. From his account, and that of subsequent writers, it is evident that it resembles in all respects in its power and operation, those of the *Apocynum*, and does not appear to be in the least superior to that native article, and has the same disadvantage of occasionally proving very inefficient, and at others, of exercising the most powerful and distressing effects. It is given in powder in doses of a scruple to a drachm, but the best form is in an aqueous extract, the dose of which is from ten to twenty grains.

Two other species are described by Dr. Martius (*Spec. Mat. Med. Brasil.*), the *C. anguifuga*, and the *C. densifolia*, the first of which is held in high repute by the natives, who term it *Poaya do sugippe*, and have much faith in it as an alexipharmic in snake-bites; for this purpose the cortical portion of the fresh root is pounded with water, and the turbid and thick infusion administered; this dose causes the most violent symptoms, as frequent eructations and violent spasmodic agitations, almost amounting to convulsions, until copious alvine evacuations ensue, followed by copious perspiration, which relieve the patient. These roots are also used in eruptive diseases, and as emmenagogues. The dose is the same as of the *C. racemosa*.

Section 2. CINCHONEÆ.—Ovary many-seeded.

PINCKNEYA.—*Michaux.*

Calyx-tube oblong, turbinate; limb 5-parted, four of the segments linear, lanceolate, the other foliaceous, coloured. Tube of the corolla cylindrical, 5-toothed; segments linear-oblong, recurved, spreading, somewhat imbricate in æstivation. Stamens 5; inserted near the base of the corolla; exserted; anthers oblong. Style filiform, stigma obtusely 2-lobed. Capsule sub-globose, coriaceo-chartaceous, 2-valved. Seeds numerous, horizontal, in a double series, flat, with a reticulated, membranaceous wing.

C. PUBENS, *Michaux.* — The only species.

Michaux, *Fl.* i. 103; Torrey and Gray, *Fl.* ii. 36; Rafinesque, *Med. Fl.* ii. 57; Barton, *Fl. Am. Sep.* t. 7.

Common Names.—Bitter bark; Fever tree; Georgia bark.

Description.—A large shrub with many stems, from fifteen to twenty feet high, with opposite and tomentose branches. The leaves are opposite, large, lanceolate, entire, slightly acuminate, shining on the upper surface, though somewhat furnished with sparse hairs, lower surface and petiole tomentose. Flowers in terminal and axillary panicles, composed of 5-flowered fascicles. Calyx superior, 5-parted, persistent, somewhat coloured; segments rarely equal and acuminate, usually 1, and sometimes 2 segments are dilated into a large, ovate, coloured leaf; when two

Fig. 174.

P. pubens.

segments are thus enlarged, they vary much in size. Corolla tubular; tube of an obscure green colour, tomentose; limb 5-parted, segments oval, obtuse, purple. Stamens inserted into the base of the corolla, longer than the tube, with incumbent, 2-celled anthers. Ovary turbinate, with a short style, having an obtuse stigma. Capsule nearly globose, opening at the summit, loculicidal. Seeds flat, orbicular, with a membranaceous wing.

This shrub is a native of Georgia and Florida, growing in wet soils along the sea-coasts; its western limits have not been fully ascertained. It was first discovered by Bartram, who considered it a species of *Mussenda*, but was erected into a separate genus by Michaux, and named by him in honour of Gen. Pinckney. It flowers in June and July. It is closely allied to Cinchona, and like that genus, it is possessed of bitter and tonic properties. The part used is the bark; this closely resembles some of the varieties of the Cinchona, both in appearance and physical characters. No accurate analysis has been made of it, but Dr. Coxe (*Am. Dispen.* 1830), states that Mr. Farr detected a considerable amount of Cinchonine in it, but from some accident, was prevented from completing the examination.

Medical Properties.—From its resemblance and alliance to the Peruvian barks, as might be supposed, it partakes of their medicinal properties. It has been used for a long time in domestic practice in the parts of the country where it grows, in intermittent fever, with much success. Dr. Law (*Am. Dispen.* 499), states that in severe cases in which he used it, it was perfectly efficient in six. It did not distress the stomach, although an ounce was given at a dose, in two of the cases. The usual dose is a drachm in substance. It may also be given in decoction, made and administered in the same manner as directed for the Cinchona. From all that can be gathered on the subject, it would appear that this bark is very like the pale Cinchona in its composition and action on the system, and is an excellent substitute for that article, but it requires further experiments to determine its exact value.

Exostemma.—*Linn.*

Calyx obovate, 5-toothed. Corolla with the tube terete, and the limb 5-parted. Segments linear. Anthers linear, exserted. Capsule crowned by the persistent calyx, dehiscing from the apex through the dissepiments, into two half-fruits. Seeds with a membranous, entire border. A genus of trees and shrubs, with oval or lanceolate, short-stalked leaves, having solitary stipules on each side of the petiole. The flowers are white or pink, in axillary or terminal panicles.

Several of the species have bitter and febrifuge barks, which contain neither quinia nor cinchonia. The *E. floribundum*, a native of the West India Islands, furnishes the *St. Lucia Bark*, or *Quinquina piton*. This is in cylindrical pieces, thin, light, very fibrous. Its external appearance is variable; internally it is dark-coloured, with longitudinal, white fibres; its fracture is of a yellowish-gray. Its odour is feeble, but nauseous, and its taste bitter and disagreeable. It acts as a tonic and febrifuge, but is apt to affect the bowels, and to cause griping pains. *E. caribæum* is a branched shrub, found in the West India Islands and Mexico. Its capsules, before they are quite ripe, are very bitter, and their juice causes a burning itching in the lips (*Jacquin. Amer.*) The bark is febrifugal, and often causes vomiting, especially if it be fresh. It is in convex fragments, composed of a yellowish, spongy, and friable epidermis, and a hard, fibrous, greenish-brown liber. The taste of it is at first sweetish and mucilaginous, afterwards bitter and disagreeable. It is known under the name of *Jamaica bark*, or *Quin-*

quina caraibe. *E. peruvianum*, a native of the colder parts of Peru, on the Andes, furnishes a very bitter, but somewhat sweet bark, having a nauseous smell. *E. souzanum*, a native of Brazil, produces a bitter bark, known as *Brazil bark*, or *Quinquina de Piauhi*. It colours the saliva yellow, and contains, according to Buchner, an alkaloid, which he calls *Esenbeckine*. The *Pitaya bark*, or *Quinquina bicolore*, is said to be furnished by a tree of this genus. It is stated to contain an alkaloid, on which its discoverers, MM. Folchi and Peretti have bestowed the name of *Pitaina*.

Remija.—*De Candolle.*

Calyx-tube obovate, limb 5-cleft, permanent. Corolla-tube slender, limb divided into 5 linear segments. Filaments unequal. Anthers linear, included. Disk fleshy, elevated, truncated, separated from the style. Stigmas 2, linear, included. Capsule opening from apex to base, dehiscent, loculicidal. Seeds numerous, winged, peltate.

The species are slender bushes, with oblong or ovate, coriaceous leaves, deeply furrowed above, opposite or ternate, revolute at the edges, and covered with ferruginous hairs beneath. The stipules are lanceolate, connate, deciduous. The flowers are in opposite fascicles, on long, axillary, interrupted racemes. The bark of all of them is bitter and febrifuge, and is known under the names of *Quina de Serra*, or *Quina de Remijo*. It is used in Brazil in fevers, but is considered inferior to Cinchona. The species best known are the *R. ferruginea* and *R. vellozii* (St. Hilaire, *Pl. us. de Bras.*)

Cosmibuena.—*Ruiz and Pavon.*

Calyx 5-toothed, campanulate, deciduous. Corolla with a long, curved tube, and a 5-parted limb. Anthers oblong, subsessile, exserted. Stigma bipartite. Capsules oblong, taper, 2-celled, somewhat 4-valved, with a septicidal dehiscence. Seeds surrounded by a membranous, lacerated wing.

South American trees, with a smooth bark, and ovate leaves, on short petioles. Stipules large, oval, obtuse, erect, deciduous. Flowers white, long, terminal. One species, *C. hexandra*, affords a bark, known as *Rio Janeiro bark*, or *Quinquina colorado*. It is of indifferent quality, containing a very little cinchonia. It is thin, blood-coloured internally, and exceedingly bitter, nauseous, and disagreeable. Gomez states that it is a good febrifuge, but too stimulating to be used in a majority of cases. M. Batka is of opinion that the *Kina nova* is also the product of this tree (*Jour. Pharm. Berlin*, xxvi. 16); but this is usually attributed to the *Portlandia grandiflora*.

Coutarea.—*Aublet.*

Calyx-tube turbinate; limb 6-parted. Corolla infundibuliform, tube short, limb 6-lobed, ventricose. Stamens inserted at the bottom of the throat. Anthers linear, exserted. Capsule coriaceous, obovate, compressed; valves bifid at their apex. Placentæ spongy, at last almost free. Seeds with membranous wings.

Shrubs or trees found in South America, having ovate leaves, and large, showy flowers. One species, *C. speciosa*, is said to afford a febrifuge bark of considerable powers. This is probably the *Guiana bark;* but it is impossible to speak with certainty, as there is much confusion and uncertainty on the subject. This has arisen from the *Portlandia hexandra* having been

assumed by some writers as the type of *Cosmibuena*, and by others as that of *Coutarea;* whilst Merat and De Lens appear to consider all of them as identical (*Dict.* v. 457). Guibourt was formerly of opinion that this species affords *Spongy Carthagena bark*, but changed his views, and now attributes this to *Cinchona lancifolia;* in which he is followed by Pereira. Many authors state that the *Kina nova* is furnished by this tree; but, as before stated, it is usually attributed to *Portlandia grandiflora*.

Hymenodictyon.—*Wallich.*

Calyx-tube ovate; limb 5-toothed. Corolla infundibuliform, 5-lobed. Stamens very short. Filaments smooth, inserted lower than the throat. Anthers exserted. Style long, prominent. Stigma clavate, capitate, somewhat lobed. Capsule naked, 2-celled, 2-valved, with a loculicidal dehiscence. Seeds surrounded with a reticulated wing, bifid at the base.

These are large trees, natives of India, with compressed branches, deciduous stipules, having glandular fringes, and small, inconspicuous, green, downy flowers. The *H. excelsa*, which is called a *Cinchona* by Roxburgh and Ainslie, is found in the mountainous parts of India, where its bark is used as a substitute for the Peruvian. Roxburgh (*Fl. Ind.* ii. 149) says, "the inner coat possesses the bitterness and astringency of the Peruvian bark; the bitter, however, on chewing is not easily perceived, but is more lasting. The bark is employed by tanners, and is also prescribed by Hindoo practitioners in cases requiring astringents."

Cinchona.—*Linn.*

Calyx persistent, 5-toothed. Corolla with a terete tube; limb hypocrateriform, 5-parted; æstivation valvate. Stamens inserted in the middle of the tube. Filaments short. Anthers linear, included. Capsule ovate or oblong, dividing along the dissepiment into two carpels, open at the commissure, and crowned by the persistent calyx. Seeds many, with a membranaceous, lacerated wing or margin. Albumen fleshy.

This very important genus consists of trees and shrubs, with shortly-petiolated leaves, having flat margins, and ovate or oblong, foliaceous, free, deciduous stipules. The flowers are paniculate, corymbose, terminal, white, or reddish. They are natives of South America, where they inhabit the mountains, at considerable elevations above the sea. Notwithstanding the great importance of this genus, and the attention it has received from botanists, much confusion and perplexity still exist, as regards an assignment of its products to the species from which they are derived. It may be asserted, that after all the labour and research bestowed upon the subject, all that is known is, that most of the species furnish valuable medicinal barks, some of which are possessed of higher powers than others; but from what species these are obtained, yet remains to be ascertained. In a few cases, however, this has been accomplished, with every appearance of exactness; but when it is recollected, that the bark of the same species may be of inferior quality and worthless, if growing in lowland districts or in confined valleys, and of high value and properties when obtained in mountainous regions, it must be conceded, that even with those species whose medicinal virtues are supposed to have been most clearly ascertained, numerous errors may still exist. Fée asserts that one kind of Cinchona passes into another, and that nobody knows with absolute certainty the origin of the various barks. Pöppig, who resided

for a long time in the bark districts, seems to be of the same opinion; and states that much prejudice exists among the *Cascarilleros* or bark collectors, and that they will reject one tree and eagerly select another without any valid reason; and also, that the same species is divided by them into several varieties, and considered to afford different qualities or kinds of bark, on no settled or definite principle. Nor are botanists less at variance, as regards the species, there scarcely being any two of them who agree. This has arisen from several causes; the principal of which is owing to the numerous varieties that occur; and hence those who have only studied them from dried specimens, have multiplied the species far beyond their true number, and thus given rise to an almost inextricable confusion.

The first account of Cinchona was given by Dr. Arrott (*Trans. Roy. Soc.* 1737). At the same period Condamine, and in 1740 the elder Jussieu, obtained specimens from near Loxa. In 1772, Mutis, a Spanish botanist, residing at Santa Fé de Bogota, having discovered Cinchona trees in the vicinity of that place, called the attention of his government to the fact, sent specimens to Linnæus, and having obtained official charge of the Cinchona forests, became a leading authority among botanists, as to the trees producing the barks of commerce; but unfortunately he has occasioned much error and confusion by asserting that the barks of the northern parts of South America were identical with those of Peru and Chili; this long misled botanists, and was the cause of many of the difficulties that have arisen; these were added to by the inaccurate information on the several species he published in conjunction with Zea.

The next to undertake the investigation were Ruiz and Pavon, who, under the auspices of the Spanish government, commenced in 1777 an examination of the botanical treasures of Peru; the results of their investigations were published from 1792 to 1801, in their *Flora Peruviana* and *Quinologia*, in which they notice many species, and ascertained the qualities of their barks. Their opinions were, however, attacked by Mutis and Zea, and unfortunately the erroneous views of the latter were generally adopted by botanists, though not to the same extent by pharmacological writers.

Humboldt and Bonpland promulgated some valuable information in their *Plantæ Æquinoctiales*, but adopted the errors and misstatements of Mutis and Zea, and hence rendered their observations of less practical value. In 1797 Mr. Lambert published his *Description of the Genus Cinchona*, and in 1821 his *Illustration* of the same, but like the authors just named, placed too much reliance on the statements of Zea, and was thus led into the same errors. This has also been the case with Römer and Schultes, in their *Systema Vegetabilium*, and with De Candolle in his *Prodromus*.

In 1838 Dr. Lindley, in his *Flora Medica*, from the ample materials with which he was furnished, did very much in settling the species and synonymy, and has given, by far, the best monograph of the genus yet laid before the world, having all the works previously published, and access to an extensive series of specimens collected by Mutis, both in Peru and Colombia, now in the possession of Dr. A. T. Thomson, as well as to that of Mr. Lambert, which, besides many others, contained nearly a complete set of those noticed by Ruiz and Pavon. From these materials he has described twenty-one species, and noticed five others. These will be adopted, with some few and slight alterations and additions, in the following pages, and although it will extend the account of the genus to a much greater length than could have been wished, it is trusted that the importance of the subject will be deemed a sufficient excuse.

1. *Limb of the corolla stupose. Leaves scrobiculate.*

Fig. 175.

C. micrantha.

1. C. MICRANTHA, *Ruiz and Pavon.*—Branches quadrangular, smooth, except among the inflorescence. Leaves oblong, obtuse, or hardly acute, rather membranous, very large, quite smooth on both sides, distinctly pitted at the axils of the veins, and either smooth or hairy there; those near the base of the inflorescence, shorter and blunter. Flowers the smallest of all the species, except *C. lancifolia.* Calyx tomentose, with a short 5-toothed limb, scarcely changed in the fruit. Corolla tomentose, woolly inside the the limb.

Ruiz and Pavon, *Fl. Peruv.* ii. 52, t. 194; *Quinol. Supp.* 1; De Candolle, *Prod.* iv. 354; Lindley, *Med. Fl.* 412; *C. scrobiculata*, Humboldt and Bonpland, *Pl. Æquin.* i. 165, t. 47; De Candolle, *Prod.* iv. 352.

This species inhabits high, cool, and wooded mountains of Peru. It affords the *silver or gray Cinchona.* According to Humboldt and Bonpland, and Ruiz and Pavon, this is commonly called *Cascarilla fina.* Pöppig terms it *Cascarilla provinciana*, and says that the trees furnish three kinds, one of which, the product of the small branches, is known as *Pata de Gallinazo* (or Vulture's claw). Mr. Reichel, who compared Pöppig's specimens with those of Bergen, is of opinion that the *Casc. provinciana* is the Huanaco bark, and the *Pata de Gallinazo* forms part of the Lima bark.

2. C. NITIDA, *Ruiz and Pavon.*—Branches and leaves quite smooth. Leaves thin, obovate-lanceolate, acute, slightly shining, tapering very regularly and gradually into the petiole, which is sometimes winged almost to its base; with deep, ciliated pits in the axils of the principal veins on the under side. Branches of inflorescence, almost smooth, except the pedicels. Peduncles corymbose, forming a small thyrsus in the axils of the upper leaves. Calyx-tube tomentose; limb campanulate, smooth, 5-toothed; teeth triangular, acute. Corolla like that of *C. lanceolata?*

Ruiz and Pavon, *Flor. Peruv.* ii. 50, t. 191; *Quinol.* 56; Lindley, *Fl. Med.* 413; *C. lanceolata, pars*, De Candolle, *Prod.; C. condaminea, pars*, Lambert; *Illust.*

Found in lofty mountains of the Andes, in cold situations. According to Ruiz, it is considered as the best of all barks, and brings the highest price in

Huanaco, Huamalies, &c.; it, like the last species, is called *Cascarilla fina*. Pöppig speaks of a bark under the name of *Casc. hoja de Ohiva*, which he thinks is produced by this tree; the same has been noticed by Ruiz, but he does not consider it to have this origin.

3. C. CONDAMINEA, *Humb. and Bonpl.* — Branches smooth to the inflorescence. Leaves quite smooth at all periods of growth, usually ovate-lanceolate, sometimes narrower and only lanceolate, occasionally ovate; rather thin, not shining on the upper surface, or but little so in some specimens; mostly with a pit or scrobicula at the axils of veins beneath, when full grown; this pit is either naked or ciliated, but young leaves are indistinctly or not all scrobiculate. Petioles smooth, about a fourth the length of the leaves; stipules oblong, obtuse, membranous, smooth. Peduncles panicled, corymbose, forming a large, loose, very downy thyrsus, in the axils of the upper leaves. Tube of the calyx tomentose, limb shortly urceolate, 5-toothed, pubescent, not shining; the teeth acute, roundish, triangular. Tube of the corolla slender, about four times as long as that of the calyx, tomentose; limb very shaggy within.

Fig. 176.

C. condaminea.

a. Calyx. *b*. Ovary and style. *c*. Corolla. *d*. Capsule split into 2 cocci. *e*. Capsule divided, showing the 2 cells. *f*. Seeds in capsule. *g*. Single seed.

Humb. and Bonp., *Pl. Æquin.* i. 33, t. 10; Lindley, *Fl. Med.* 414.

Inhabits on the mountains near Loxa, and several other places in Peru, always in micaceous schist, and occupies a zone of 1800 feet growing at elevations between 5700 and 7500 feet. According to Dr. Lindley, a manuscript note of M. Bonpland, in Mr. Lambert's Herbarium, states, this is the *C. lancifolia* of Mutis, but Humboldt asserts that species to be the same as *C. angustifolia*, Ruiz, which he also deems to be different from *C. condaminea*. This species furnishes the *Cascarilla fina de uritusinga* or Crown, or Loxa bark.

2. Limb of corolla not stupose. Leaves not scrobiculate.

4. C. LANCIFOLIA, *Mutis.*—Branches quadrangular, except when very young, when they are covered with short spreading hairs. Leaves oblong, lanceolate, very acute at both ends, revolute at the edge; somewhat coriaceous, not shining, smooth above, thinly beset with hairs on the veins underneath, not scrobiculate. Peduncles axillary, hairy, 3-fid, shorter than the leaves, and not forming a panicle or thyrsus; the divisions cymose and about 5-flowered. Tube of calyx tomentose; limb smooth, campanulate, 3—5-toothed, teeth revolute at the apex. Corolla hairy, the smallest in the genus, with a tube

about three times as long as the cup of the calyx. The limb on each side smooth, surmounted by an enlarged calyx.

Mutis, *Period. de Santa Fé.;* Lindley, *Fl. Med.* 415; *C. angustifolia*, Pavon, *Quinol. Supp.* xiv. *f. a.; C. tunita*, Lopez, *MSS.*

Found in woods in Colombia and around Sante Fé. Dr. Lindley states that it has the credit of furnishing the best *Pale bark* of commerce, but according to Pereira, it affords the *new spurious yellow bark*, which is the *Quinquina de Carthagene spongieux* of Guibourt, and which he found to be identical with the *Quina naranjada* of Mutis, which is indubitably the product of this species.

5. C. LUCUMÆFOLIA, *Pavon.*—All parts of the plant quite smooth, except the corolla. Leaves oval, lanceolate, obtuse, coriaceous, shining, somewhat revolute at the edges. No trace of pits on the lower surface; gradually narrowing into rather a long petiole. Peduncles axillary, corymbose, longer than the leaves, somewhat spreading, but stiff, often forming a large open thyrsus. Calyx with a campanulate limb, having 5 shallow, triangular teeth. Corolla tomentose, except at the base, which is nearly smooth, with the tube thrice as long as the calyx. The limb shaggy inside.

Pavon, *Herb. Lamb.;* Lindley, *Fl. Med.* 416; *C. stupea*, Pavon, *Herb. Lamb.*, *C. condaminea*, *pars* Lambert.

This species is found at Loxa in Peru, and is placed by Ruiz among those which furnish the *Quina fina de Loxa.*

6. C. LANCEOLATA, *Ruiz and Pavon.*—Branches smooth to the inflorescence. Leaves almost smooth at all ages; generally quite elliptical and acute at each end, sometimes more oblong, occasionally roundish-oblong and obtuse or almost cordate at base; coriaceous, very shining on the upper surface, with rather prominent veins beneath, which are hairy or smooth, usually hairy at the axils, and but slightly, if at all scrobiculate. Petioles smooth, sometimes downy when young, from a tenth to a sixth as long as the expansion. Peduncles panicled, corymbose, scarcely longer than the upper leaves, to which they are axillary, forming a close, compact thyrsus, covered with a short thick down. Tube of the calyx downy. Limb campanulate, shining, mostly smooth, with acute or acuminate triangular teeth. Tube of the corolla cylindrical, tomentose, about thrice as long as that of the calyx. Limb very shaggy within.

Ruiz and Pavon, *Fl. Peruv.* ii. 51, iii. t. 223; Lindley, *Fl. Med.* 416.

Inhabits cold elevated situations in the Andes. The bark is said by Ruiz and Pavon to be known as *cascarilla* or *Quina boba amarilla*, from its colour internally, and that the flavour is like that of *Quina de Calisaya.* Ruiz in his manuscript states that it is also called *Quina anteada*, *cascarilla amarilla*, and *casc. boba de muña*, and that it is one of the finest sorts. That it is the source of Calisaya or yellow bark is confirmed in part by the observations of Guibourt, who says that on an examination of specimens brought from Upper Peru by M. Delondre, purporting to be from trees furnishing calisaya bark, they were found to belong to *C. micrantha*, *condaminea*, and three other species, but in the interior of one of the quills, he detected a leaf, appearing to belong to *C. lanceolata*, and hence he conjectures this to be really the species affording the bark.

7. C. OVALIFOLIA, *Humb. and Bonp.*—Branches smooth, apparently angular and furrowed. Leaves rather thin, oval, scarcely acute at the apex, tapering into an unusually short petiole, except in the case of those leaves next the panicle, which are rounded at the base, so as to have an ovate or even cordate form; not shining, smooth on the upper side, finely and impalpably downy on the lower surface, especially when young; with the veins, particularly the axils, distinctly hairy, but no signs of pits; when old

losing the down. Panicle terminal, naked, thyrsoid, small, occasionally with small leaves subtending the lower branches. Calyx tomentose, with a shallow, 5-toothed, downy limb, which does not alter its form after flowering, except by enlarging a little and hardening. Corolla tomentose, rather infundibuliform, as small as in *C. micrantha*, with the tube three or four times as long as that of the calyx. Limb shaggy within. Fruit oval, rather downy, very strongly ribbed when mature.

Fig. 177.

C. ovalifolia.

Humboldt and Bonpland, *Pl. Æq.* i. 65, t. 19; Lindley, *Fl. Med.* 417; *C. Humboldtiana*, Romer and Schultes, v. 13; De Candolle, *Prod.* iv. 353.

Grows on the Andes in the vicinity of Loxa, &c. Humboldt and Bonpland state that the bark of this species is not much esteemed, but that much of it was collected, and that it was called *cascarilla peluda*, or velvet-leafed quina. Pereira says it is the *white cinchona of Mutis*.

8. C. OVATA, *Ruiz and Pavon.*—Branches quadrangular, smooth, except towards their ends, where they are hairy rather than tomentose. Leaves large, thin, ovate-oblong, when young, velvety beneath, with a short thick felt, which is detached as the leaves grow older, smooth on the upper side; when full grown obtuse or rather acute at base, with smooth veins, but shaggy axils; the uppermost leaves almost cordate. Peduncles thick, quadrangular, tomentose, branched in the axils of the upper leaves, and leafy at their own base, forming a coarse, compound panicle. Flowers sessile or nearly so, in thick clusters. Calyx very tomentose, except the limb, which is smooth, thick, campanulate, 5-toothed, and apparently of a deep purple colour. Corolla purple, according to Ruiz and Pavon, tomentose, with a white, spreading, shaggy limb.

Ruiz and Pavon, *Fl. Peruv.* ii. 52, t. 195; Lindley, *Flor. Med.* 417.

Inhabits close, badly-ventilated woods, in the hottest parts at the foot of the Andes, near Huanaco. Dr. Lindley states that according to a note in the handwriting of M. Bonpland, in Mr. Lambert's Herbarium, it is considered by him as a variety of *C. cordifolia* of Mutis. But Dr. Lindley says that it is perfectly distinct, both from that species and the *C. pubescens* of Vahl. Pavon, (*Quinol. Supp.* 18,) also says that it is the same as *C. cordifolia*, producing the *Quina amarilla* of Santa Fé, but Ruiz in his manuscripts does

not confirm this, as he expressly states that he is unable to say what species affords the *Quina amarilla* or *Q. baya de Santa Fé*. In his work he says this is called *Cascarilla con corteza de color de Pata de Gallereta*. Pereira, on the other hand, observes that Bergen found his *China jaen* or ash-coloured bark to be identical with that of the *C. ovata*, contained in Ruiz's collection.

9. C. ROTUNDIFOLIA, *Ruiz and Pavon.*—Branches covered with a short, thick fur near their extremities. Leaves roundish-oblong, obtuse but not cordate at the base, scarcely acute, thin, quite naked on the upper side, except along the midrib, beneath soft with down, not pitted. Petioles and veins covered with a close thick fur. Peduncles corymbose, tomentose, forming a close leafy thyrsus in the axils of the upper leaves. Calyx tomentose, with a short, 5-toothed limb. Corolla tomentose, rather infundibuliform, with the tube about four times the length of that of the calyx. Segments of the limb shaggy within.

Ruiz and Pavon, *MS.;* Lambert, *Illus. Cinchon.* 5; Lindley, *Flor. Med.* 418.

This species is found in Loxa. Nothing is known of the bark it affords.

10. C. CORDIFOLIA, *Mutis.*—Branches quadrangular, smooth. Leaves roundish, obtuse at both ends, especially at base, or roundish-oblong and tapering to the base, strongly-veined, thin, smooth above, downy beneath, and hairy at the veins and axils when young, becoming nearly smooth when old; never pitted. Panicle contracted, thyrsoid, leafy at base, or formed of corymbose peduncles, axillary to the upper leaves, with the ramifications tomentose. Calyx tomentose, with a large, smooth, campanulate, 5-toothed cup, the lobes of which become quadrate and cuspidate; the tube sub-globose when it first begins to enlarge after the fall of the corolla, afterwards becoming longer. Corolla tomentose, with a thick tube, whose diameter is equal to the length of the shaggy lobes.

Mutis, *MS.;* Humb., *Berlin. Mag. d. Naturf.*, i. 117; Stephenson and Churchill, iii. 185; Lindley, *Flor. Med.* 419.

Mountains of New Granada, at an elevation of from 5000 to 8000 feet. According to Humboldt and Bonpland, this tree furnishes *Quina jaune*, but there may be some error in this, as Dr. Lindley states that Bonpland confounded several species under this name. Ruiz and Pavon also say, that their *C. ovata* is the *C. cordifolia*, Mutis, and affords the *Quina amarilla* of Santa Fé; but in his *MS.*, Ruiz speaks of the bark of *C. ovata* as totally distinct from the *Q. amarilla*. Dr. Lindley supposes that the *Quina baya* or the *Q. amarilla* may be the product of this species, and Pereira states that the bark spoken of by Mutis, under this latter name, has been ascertained by Bergen and Guibourt to be the *Hard Carthagena bark*.

11. C. PUBESCENS, *Vahl.*—Young branches, covered with a short, close down. Leaves never pitted; when young, rather thin, not shining, somewhat downy on both sides, most so on the under and upon the petioles; when older quite smooth, much firmer, and quite shining; those near and among the inflorescence roundish, somewhat broader than long, tapering into a long stalk, or merely ovate; those below the inflorescence ovate-oblong, or nearly oval, and acute. Peduncles trichotomously-branched, corymbose, many-flowered, tomentose in the axils of the upper leaves, forming a short and broad, spreading and leafy thyrsus, the flowers in which are by no means compactly arranged; the subdivisions being at almost right angles with each other. Pedicels and calyx-tube covered with a close fur; the limb of the latter downy, with five shallow, ovate, acute teeth. Corolla tube tomentose, much contracted at base, and nearly six times the length of that of the calyx; limb deep purple, shaggy inside. Fruit tomentose, narrow, oval, as thick at one end as at the other; about an inch long.

Vahl, *Act. Hafn.* i. 19, t. 2; Lambert, *Descript.* 21, t. 2; Lindley, *Flor. Med.* 419; *C. purpurea*, Ruiz and Pavon, *Flor. Peruv.* ii. 52, t. 193.

Woods at the lower parts of the Andes, where it is cool at night. Low hills in many parts of Bolivia, Peru, and Chili. Dr. Lindley observes, that this is probably the plant meant in the drawing sent by Mutis to Linnæus, under the name of *C. peruviana*. In Peru it is one of the species called *Cascarilla boba de hoja morada*, according to Ruiz, who states that the bark is not known separately in commerce, but is mixed with those of *C. lanceolata*, *hirsuta*, and *nitida*, and is fully equal to them (*Quinol.*); but Lindley states, that in his *MS.*, he classes it only with the second-rate barks. Pöppig, who calls it *Casc. boba colorada*, says that the bark in a fresh state is very bitter, and may be useful for making cheap decoctions, as its value is low. It is not now much collected. Reichel determined from Pöppig's specimens that they belong to the *Huamalies* bark of commerce.

12. C. HIRSUTA, *Ruiz and Pavon.*—Young branches short-jointed, bluntly 4-angled, covered with coarse hair. Leaves oblong, acute or obtuse, coriaceous, revolute at the edge, shining above, with hairy veins, not pitted beneath. Peduncles shaggy, trifid, densely corymbose, in the axils of the upper leaves forming a compact, leafy thyrsus. Calyx-tube tomentose, angular; limb deeply campanulate, pubescent, with five acuminate teeth recurved at the apex. Corolla with a cylindrical, tomentose tube, four times as long as that of the calyx; limb revolute, very shaggy. Fruit obovate, smooth, rather strongly-ribbed and veined.

Ruiz and Pavon, *Flor. Peruv.* ii. 51, t. 192; Lindley, *Flor. Med.* 421.

Occurs in high and cold situations on the Andes. It affords a kind of *Cascarilla fina*, formerly employed under the name of *Quina delgadilla* or *delgada*, but not now much collected, as other kinds can be more readily obtained. (Ruiz.) Dr. Lindley is of opinion that it probably forms part of the fine *Yellow bark* of commerce.

13. C. GLANDULIFERA, *Ruiz and Pavon.*—Young shoots quadrangular, clothed with a short fur. Leaves oblong, usually cordate, obtuse or acute, with short petioles, rugose, undulated, shining and smooth above, covered with a short coarse hair beneath; the secondary veins are prominent. Seldom any trace of the glands described by Ruiz and Pavon as existing at the axils on the upper side, and when present, they are in the form of a minute, discoloured, scar-like spot. Peduncles tomentose, leafy, branched, forming a thyrsus rather than a cyme, in the axil of the upper leaves, the whole constituting a loose, leafy inflorescence. Calyx-tube tomentose; limb campanulate, nearly smooth, as long as the tube, with five sharp, ovate teeth. Corolla tomentose, with a short, thick tube; the limb woolly inside.

Ruiz and Pavon, *Flor. Per.* iii. t. 324; Lindley, *Flor. Med.* 421; *C. mutisii*, Lambert, *Illus.* 9.

There is a variety with smaller, more even leaves, not cordate; this is the *C. mutisii*, Lambert.

Found on wooded mountains in Peru. It is called *Cascarilla negrilla* by the bark collectors, and ranks next in quality to the bark of *C. lanceolata*, and is much better than that of *C. lancifolia*. (Ruiz.) Pöppig says it furnishes the best bark gathered near Cuchero. The same writer states that the *Casc. provinciana negrilla* is obtained from this tree, growing in warmer situations. Reichel was not able to identify Pöppig's specimens of this bark, with any known in trade, but is of opinion that it is equal to the best sorts from Loxa.

14. C. VILLOSA, *Pavon.*—Young branches somewhat quadrangular, villous, with long, loose hairs. Leaves ovate-lanceolate, or oblong-lanceolate, rather thin, acuminate, but hardly acute, pointed at base, not shining, upper ones among the flowers ovate; almost destitute of hairs on the upper side, except the midrib; beset with scattered, numerous,

shaggy hairs on the under side, especially the veins and petioles. Panicles terminal, rather long, leafy towards the base, with very villous pedicels. Calyx tomentose, with a short, half-cleft limb. Corolla? Fruit about half an inch long, oval, rather strongly-ribbed, tomentose.

Pavon, *MS.*; Lindley, *Flor. Med.* 422; *C. humboldtiana*, Lambert, *Illus.* 7.

Inhabits St. Jaen de Loxa. Nothing is known respecting its bark.

15. C. OBLONGIFOLIA, *Lambert.*—Young shoots quadrangular, densely tomentose. Leaves large, ovate-oblong or rather cordate, obtuse, scabrous, with down on the upper surface, very densely and softly tomentose beneath, and having strong and prominent veins. Petioles tomentose, long. Panicle rather small, thyrsoid, terminal, tomentose, leafless, shorter than the upper leaves. Calyx coarsely tomentose; the limb with five sharp teeth. Corolla coarsely tomentose externally; the tube about thrice as long as that of the calyx; the limb smooth inside, except at the edges, which are tomentose.

Lambert, *Illus.* 12; Lindley, *Flor. Med.* 422; not of Mutis.

Is a native of St. Jaen de Loxa. Nothing is known respecting its bark.

3. Limb of the corolla smooth, or only downy at the edge.

16. C. ACUTIFOLIA, *Ruiz and Pavon.*—Shoots quadrangular, when quite young covered with a fine soft down. Leaves ovate-lanceolate, acuminate, acute or obtuse at base, coriaceous, very even, somewhat undulate; the midrib and veins of the lower surface covered with long fine hairs, especially at the axils, which are not pitted; the uppermost leaves much narrower than the lower. Inflorescence leafless, tomentose. Calyx-tube very tomentose; limb pubescent, deeply divided into long, narrow-channelled, obtuse teeth. Corolla almost smooth, much longer than the calyx; the segments of the limb smooth inside, except at the edge, which is covered with a short close down.

Ruiz and Pavon, *Flor. Peruv.*, iii. 1, t. 225; Lindley, *Flor. Med.* 423.

Mountains of the Andes. Bark worthless. It is the *Cascarilla de hoja aguda*, Ruiz and Pavon.

17. C. MAGNIFOLIA, *Ruiz and Pavon.*—Young branches quite smooth, scarcely angular. Leaves oblong, sometimes narrowed towards the base, obtuse, often a foot long, coriaceous, strongly-ribbed, shining on both sides, perfectly free from hairiness, except when very young, unless on the principal veins and at their axils. Flowers in a large terminal, leafless thyrsus, with erect branches, merely downy, not woolly. Calyx-tube clothed with a very short, dense tomentum; limb pubescent, smooth at the edges, with oval, obtuse, imbricating teeth. Corolla externally tomentose, with a tube hardly four times as long as that of the calyx; limb quite smooth inside, except just at the edges, which are tomentose. Fruit smooth, narrower at the base than at the apex, slightly ribbed.

Ruiz and Pavon, *Flor. Peruv.*, ii. 53, t. 196; Lindley, *Flor. Med.* 423; *C. caduciflora*, Lambert, *Illus.* 11, not of Bonpland; *C. oblongifolia*, Mutis, according to Ruiz and Pavon, not of Lambert.

Found in abundance on the mountains of Panatahuas, &c., in low land near torrents, in situations fully exposed to the sun, but badly ventilated. There is some discrepancy of opinion with regard to this species. Dr. Lindley says, that in Dr. Thomson's Herbarium there is a branch of a plant resembling this, but also approaching to *C. pubescens*. This is what Mr. Lambert described as the *C. magnifolia* of Ruiz and Pavon; whilst what he calls *C. caduciflora* is the true *C. magnifolia* of the authors of the Flora Peruviana, but very different from M. Bonpland's plant of the former name. Ruiz calls this species *Cascarilla amarilla* (*Quinol.* 71), and elsewhere speaks of it as *Casc. de flor de Azahar*, and says it is not met with in commerce, except in the form of an extract, which is of good quality. Ruiz and Pavon state that it is *C. oblongifolia*, Mutis, but it is wholly dif-

ferent from the species called by that name by Mr. Lambert. Dr. Lindley says that Ruiz, in his MS., speaks of the bark as being indifferent, and says it is the *Quina roxa* of Santa Fe, the red cinchona of Mutis. Bergen found this was the case, and that it was the poor Red bark known in commerce as *Quinquina nova*.

18. C. CADUCIFLORA, *Bonpland.*—Dr. Lindley says that he has seen no specimens, but that it appears to differ from the last in its corolla being quite smooth, with a tube of only twice the length of the limb of the calyx, and in the stamens being inserted near the base of the tube, and not near its middle; nor is the fruit obovate.

Bonpland, *Pl. Æqui.*, i. 167; Lindley, *Flor. Med.* 424.

Grows near the town of Jaen de Bracamoros. It is stated in the *Plantes Æquinoctiales* that the bark of it is called *Cascarilla bora*, and that no use is made of it, but that the trunk contains a great quantity of resin.

19. C. STENOCARPA, *Lambert.*—Branches somewhat quadrangular, slightly pubescent when young. Leaves elliptical, acute, tapering to the base, where they terminate in a long, smooth footstalk, rather shining, not coriaceous; smooth on the upper side, paler beneath, and slightly hairy, particularly on the veins and at the axils; principal veins prominent. Calyx-tube long, narrow, tomentose; limb 5-parted, pubescent, rather membranous, and with the segments acute. Corolla pubescent; tube slender, infundibuliform, rather more than thrice as long as that of the calyx; limb slightly spreading, with narrow, acute segments, which are smooth, except at the edges. Flowers in terminal, thyrsoid, loose, leafless, pubescent panicles. Fruit long, narrow, smooth, of the same width at each end.

Lambert, *Illus.*, 13; Lindley, *Flor. Med.* 425.

Found at Jaen in the mountains of Loxa. Dr. Lindley says this species is so like the last, except that the corolla is proportionably longer, that he should be inclined to think them the same, if M. Bonpland had not stated that the leaves of that species were similar to those of *C. magnifolia*. Nothing is known respecting its bark.

20. C. MACROCARPA, *Vahl.*—Young branches acutely 4-angled, very tomentose. Leaves coriaceous, obovate, obtuse, revolute at the edge, sometimes a little cordate; when young tomentose on both sides; when full grown, smooth and shining above, except the midrib and principal veins, which continue tomentose; beneath, thinly covered with down, except the midrib and large veins, which are very tomentose. Cyme terminal, of about 9 pedicellate flowers in 3 parcels; very tomentose, with a pair of small rhomboidal, obtuse leaves at base. Branches of inflorescence and pedicels short and thick. Calyx ob-conical, very tomentose without and within, with a spreading, shallow, 5-toothed limb. Corolla very tomentose, limb spreading, smooth inside, tomentose at the edge.

Vahl, *Act. Hafn.* 1, 20, t. 3; Lambert, *Descript.* 22, t. 3; Lindley, *Med. Flor.* 425; *C. ovalifolia*, Mutis; Humb., *Berl. Mag.*, i. 118.

Occurs at Loxa, and also in the northern Andes. There is some difficulty as regards this species. Dr. Lindley says he has seen but a few bad specimens of it, and that a single fruit in Mr. Lambert's Herbarium appears to approach that of a *Cosmibuena*, but does not resemble that figured by Vahl, which is very like the capsule of *C. magnifolia*. That this is not a Cosmibuena is shown by its valvate corolla and permanent calyx, though it is said in *Plantes Æquinoctiales* (i. 67), to be the same as *C. obtusifolia*. Ruiz and Pavon state that it is the *Quina blanca* or *Cinch. ovalifolia* of Mutis, but at present the bark is unknown.

21. C. CAVA, *Pavon.*—Young branches very tomentose. Leaves petiolate, oblong, subcordate or obtuse at base, obtuse or rounded at tip, rather coriaceous, smooth above; tomentose beneath. Cyme terminal, compact, trifid, tomentose, shorter than the subjacent

leaves. Calyx-tube long, narrow, tomentose; limb cyathiform, spreading away from the corolla, pubescent, with 5 shallow, blunt teeth. Corolla long, externally tomentose; tube somewhat curved; limb valvate, tomentose, not stupose. Anthers inserted in the throat. Fruit cylindrical, long, smooth, not ribbed.

Pavon, *MS. in Herb. Lamb.;* Lindley, *Flor. Med.* 426; *C. pavonii*, Lambert, *Illus.* 8.

Grows in the neighbourhood of Quito. All further that is known of it is, that it is said to be called *Canela.*

Species imperfectly known.

These, as enumerated by Dr. Lindley, are

22. C. DICHOTOMA, *Ruiz and Pavon.—Flor. Peruv.* 11, 53, t. 197.—Grows on the Andes. It is very uncertain whether this is a Cinchona. Ruiz and Pavon say that it has the reputation of being one of the *Quinas finas.*

23. C. MACROCALYX, *De Candolle, Prod.* iv. 353.

24. C. CRASSIFOLIA, *Pavon in De Candolle, Prod.* iv. 354.

25. C. PELABA, *Pavon in De Candolle, Prod.* iv. 355.—Possibly *C. rotundifolia.*

26. C. MUZONENSIS, *Gondot in De Candolle, Prod.* iv. 355.

Martius has described three others (*Pharm. Cent. Blatt.* 1831), under the names of *C. bergeniana*, *C. lambertiana*, and *C. macrocnemia*, and Bentham (*Walper's Repert.*) one, *C. ronaima.*

Cinchona was so named by Linnæus, in compliment to the Countess of Cinchon, the wife of the then Viceroy of Peru, who was cured of an ague by it, and brought some of the remedy to Europe in 1640; hence it was called *Pulvis comitissæ.* But the history of its discovery is involved in doubt, and many fables have been invented as respects it. The natives of the country, who called the trees *kina* or *kinken*, attached no febrifugal importance to the bark, and are even now said to entertain a prejudice against its use. Humboldt is of opinion, that the most probable explanation of the discovery of its virtues, is one that he found current at Loxa. That the Jesuit missionaries endeavoured to ascertain the qualities of different plants by the taste, which led them to notice the remarkable bitterness of that of the Cinchona, and hence were induced to make trial of it as a febrifuge in the intermittent fevers so prevalent in Peru. The successful results of their experiments led them to make the article known in Europe, and for a long time they were the sole vendors of it, whence its name of Jesuits' bark.

As before stated, the Cinchonas are found on the Andes, principally in Colombia, Bolivia, and Peru, or from 11° N. to 20° S. latitude; but the extent to which they extend to the eastward has not been ascertained, except that a species has been found by Mr. Bentham in Guiana. Their greatest prevalence appears to be to the west of the Andes, where they occur at elevations varying from 1200 to 10,000 feet; the most esteemed kinds are in dry situations, and at an average height of about 6000 to 8000 feet, and at an average temperature of about 68° F.

The mode in which the bark is gathered varies somewhat in different parts of the country; though on one point all are agreed, that the quality and appearance depend much on the celerity with which it is dried. Full information on this subject and on the bark districts, will be found in a memoir by Pöppig (*Companion to Bot. Mag.* 1), and in Stevenson's *Narrative of a Twenty Years' Residence in South America*, as well as the *Quinologia* of Ruiz and Pavon. Cinchona is imported in chests or seroons from various ports on the

Pacific coast of South America, also some inferior kinds from Maracaibo. Some likewise reaches this country by way of Europe.

As regards the classification of barks, numerous plans have been devised; some founded on the botanical arrangement of the species from which they are supposed to be derived; some on their chemical composition, as those of Gœbel and Geiger; others on their physical characters, which, in the present state of our knowledge, is by far the best; such are that of Bergen (*Versuch einer Monog. der China*, 1826), of Guibourt (*Hist. Abreg. des Drog. Simp.* 1826), that of Lindley (*Flor. Med.* 1838), and that of Pereira (*Elem. Mat. Med.* 1838); this latter, which is adopted by Royle, is a good one; but as it does not agree in the names of the species with those of the preceding monograph, that of Lindley is preferred; this is:

a. *Pale Barks.*	
Crown or Loxa,	C. condaminea.
Gray, or Silver, or Huanaco,	C. micrantha.
Ash or Jaen,	Unknown.
White Loxa,	Unknown.
b. *Yellow Barks.*	
Yellow,	C. lanceolata; also, C. hirsuta and C. nitida.
Calisaya,	C. lanceolata?
Carthagena,	C. cordifolia?
Cusco,	Unknown.
c. *Red Barks.*	
Red Bark of Lima,	Unknown.
Cinchona nova,	C. magnifolia.
d. *Brown Barks.*	
Huamalies,	C. purpurea.

The divisions adopted by the different colleges and pharmacopœias into Pale, Yellow, and Red barks, is sufficient for general practical purposes, though they are faulty in their assignments of these to certain species. I shall not enter into an account of the various physical characters of these barks, further than to say that the Pale barks are almost always quilled, somewhat fibrous, with a more astringent than bitter taste; their powder is of a grayish-fawn colour, and they contain much *Cinchonia* and little Quinia. The Yellow barks, of which the best is the Calisaya, are either in quills or flat pieces, more or less fibrous, are less astringent, but more bitter than the Pale barks; the powder is of a yellow-orange colour, and they contain much *Quinia* and little Cinchonia. The Red barks are in quilled, but oftener in flat pieces, much thicker than the other kinds, and coarsely fibrous; the powder is of a reddish-brown colour; the taste is very bitter, with a little aroma; they contain both *Quinia* and *Cinchonia*.

The Cinchonas have often been analyzed, and with various results; but it may be stated, from the more recent examinations of them, that besides the usual constituents of barks, as Woody fibre, Starch, Gum, Fatty, and Colouring matters, &c., they contain several peculiar principles, as a *Volatile oil* of a thick consistence, acrid taste, and having the odour of the bark; an *Insoluble red colouring matter*, or Red cinchonic, agreeing in its properties with *Catechine;* two alkaloids, *Quinia* and *Cinchonia*, in combination with a peculiar acid, called the *kinic;* and in one kind of bark, the *Cusco*, Pelletier has discovered a third, which he denominates *Aricina;* a fourth has also been announced, *Chinoidina*, but it is doubtful whether it is really distinct.

Quinia exists in all the Cinchona barks; but most plentifully in the yellow varieties, in all of them in the form of Kinate of quinia. It is most readily obtained by precipitating it from a solution of the disulphate, by means of ammonia. It is in the form of a white powder, being crystallized with much difficulty; it is readily fused into a resinous mass; it is little soluble in water, but easily so in alcohol; it forms crystallizable salts with acids, the solutions of which are precipitated by tannin. It is usually employed in the form of the Disulphate, which is the preparation generally known under the name of Quinine. Comp. C^{20} H^{12} O^2 N.

Cinchonia also is found in all the barks, but is in the largest proportions in the pale varieties. It always occurs in the form of a Kinate. When pure, it is in large, brilliant, four-sided prisms, nearly insoluble in cold water, but readily so in alcohol. It forms crystallizable salts with the acids, and the solutions of them are precipitated by tannin. Comp. C^{20} H^{12} N O.

Medical Uses, &c.—Cinchona and its preparations are universally admitted to be the most powerful and effective of all of the vegetable tonics. The barks, in substance, decoction, or infusion, are somewhat astringent, but eminently tonic and antiperiodic. When taken in a moderate dose, and repeated in a few hours, it causes increased force and frequency of the pulse, augmented heat of the surface, and an improved tone of the system generally. The digestive and assimilative functions are promoted, but the secretions of the mucous membranes are usually diminished, and in most persons constipation is induced, though occasionally an opposite condition ensues. Bark is prescribed as a tonic where debility exists, but more especially to arrest the attacks of periodic diseases, as Intermittent and Remittent fevers, Neuralgia, &c. In what manner it acts, is not understood, though various hypotheses have been formed on the subject. Bark is given, in substance, decoction, infusion, and tincture. But since the discovery of Quinia, this alkaloid, in the form of the sulphate, has nearly superseded all other preparations. The numerous applications of Cinchona and Quinia to different forms of disease and conditions of the system, cannot be treated upon in a work of the present character without exceeding all due limits.*

The dose of Bark, in powder, is from ℈j. to 3j., or more where the stomach can bear it; of the infusion, from f℥j. to f℥ij. three times a day; of the decoction, about the same; of the tincture, from f3j. to f3iij. The sulphate of Quinia is given in doses of gr. j. to grs. v.; but of late years, in some parts of our country, in much larger quantities, it having been exhibited in ℈j. doses, and it is said with good effects. Many other salts of Quinia have been highly praised, a full account of which will be found in Professor Dunglison's New Remedies.

Uncaria.—*Schreber.*

Calyx 5-cleft, urceolate, limb short. Corolla funnel-shaped, throat naked, lobes five, spreading, oval-oblong, tube slender. Anthers included or protruded. Style filiform, exserted; stigma tumid, not cleft. Capsules pedicellated, clavate. Seeds numerous, winged, imbricated.

A genus of climbing plants, principally found in the East Indian islands and Malayan peninsula, having flowers in loose heads, the peduncles when old, becoming axillary, compressed, hooked spines.

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* See on this subject, Pereira, *Elem. Mat. Med.*, ed. 2d, ii. 444, *et seq.*; Dunglison, *New Remedies*, ed. 5th, 524, *et seq.*; Dunglison, *Therap. and Mat. Med.*, ed. 3d, ii. 76, *et seq.*, &c.

U. GAMBIR, *Roxburgh.*—Branches terete. Leaves ovate-lanceolate, acute, smooth on both sides, petioles short, with ovate stipules. Peduncles axillary, solitary, opposite, with bracteoles near the middle; lower ones sterile.

Roxburgh, *Fl. Ind.* i. 517; De Candolle, *Prod.* iv. 347; Lindley, *Flor. Med.* 405; Pereira, *Mat. Med.* ii. 468; *Nauclea gambir*, Hunter, *Trans. Linn. Soc.* ix. t. 22; *Funis uncatus*, Rumphius, *Herb. Amboin.* v. t. 34.

Description.—Leaves opposite, from ovate-oblong to ovate-lanceolate, entire, acute, smooth on both sides; petioles short, with oblong-ovate stipules, uniting the upper margin of their base. Spines axillary, solitary, or in opposite pairs, simple, recurved, hooked. Peduncles axillary, solitary, jointed and bracteolated about the middle, supporting a single globular head of green and pink flowers. The bracts form a 3—4-cleft, circular involucre. Calyx silky on the outside, with a 5-cleft limb. Tube of the corolla filiform; limb of 5 obtuse divisions, villous externally, and hairy at the centre internally. Filaments short. Anthers large, at the mouth of the tube. Ovary turbinate, sub-sessile, sericeous, supporting a style as long as the tube of the corolla, having a clavate stigma. Capsules pedicellate, clavate, longitudinally grooved, crowned by the persistent calyx; 2-celled, 2-valved. Seeds numerous, imbricated, winged.

Inhabits the islands of the Indian Archipelago, and is largely cultivated in many places. A decoction of the leaves of this plant inspissated and dried by heat, affords an article called *Gambir* in the East Indies, and *Terra japonica* in Europe, where it is largely imported for tanning. This product is a species of *Catechu*, and is designated as *Catechu in square cakes* by druggists. There are, however, several forms or varieties of it noticed by Mr. Bennett, (*Med. & Phys. Journ.* lxvii.) One, in small round cakes, of a pale purplish-white colour, which is considered the best. The second in squares, which is that usually imported; this is in cubes of about an inch square, lighter than water, of a yellowish-brown or deep reddish-brown colour exteriorly, and of a yellowish cinnamon-brown within; the fracture is dull and earthy; it has scarcely any odour; its taste astringent and bitter, with finally a sweetish flavour; it melts readily in the mouth. The third is in cylindrical pieces, of a pale, dull, pinkish-yellow colour internally, and somewhat darker on the outer surface; it is heavier than water, and is less astringent in its taste than the other kinds; it feels gritty when chewed. These varieties may not all be the product of the Uncaria, as Crawford (*Indian Archipelago*) says, Gambir is produced from two different plants, but usually from the *Funis uncatus* of Rumphius.

Medical Uses, &c.—Gambir has all the properties of Catechu, and is used for it, in the cases to which that article is applicable.

Numerous other plants of this extensive order have been used in medicine, among which the following are deserving of a brief notice. According to Martius (*Specim. Mat. Med. Bras.*), the root of *Manettia cordifolia* is employed in Brazil as an emetic, and is also held in much esteem in dysentery, in doses of about thirty grains to a drachm. The fruit of *Randia dumetorum*, when bruised and thrown into the water, will intoxicate fish. It is considered by Hindoo physicians as one of their best emetics, for which the whole nut is pounded. An infusion of the bark of the root is prescribed to produce nausea in bowel complaints (Ainslie, *Mat. Ind.* ii. 186). The fruit of *Gardenia grandiflora* is thought in India to be cathartic and anthelmintic (Roxburgh, *Fl. Ind.* i. 170). The bark of *Condaminea corymbosa* is tonic and febrifuge; it is only slightly bitter, but somewhat viscid. Ruiz and Pavon (*Fl. Peruv.* ii. 48), say that it is used by the bark-gatherers in Peru, to adulterate Cinchona.

The leaves, bark, and root of *Ophiorhiza mungos*, are in high repute in Ceylon as an alexipharmic. The parts are so intensely bitter that the Malays call the plant by a name signifying Earth-gall; according to Kæmpfer (*Amœn.*), the taste resembles Gentian, but is more penetrating, though less unpleasant. It has also been noticed by Avicenna under the name of *Loheih.* On the other hand, both Roxburgh and Horsefield state that it is insipid and inert, and think that it has been confounded with the *Ophioxylon serpentinum*, which is certainly active. The leaves of *Oldenlandia umbellata* are thought in India to be expectorant; and when dried and mixed with flour are made into cakes, and eaten by those suffering from pectoral affections. The root affords an excellent and durable red dye (*Ainslie*, ii. 101).. Much the same virtues are attributed to the leaves of *Nonatella officinalis* in Guiana, where it is called *Azier á l'asthme* (*Aublet*, i. 183.)

The root and bark of *Antirrhœa verticillata* are powerful astringents, and in the Isle of Bourbon they are employed to arrest hæmorrhagies (*Merat and De Lens*, i. 355). The leaves of *Pœteria fœtida* are alliaceous and fetid, and a decoction of them is employed in India, to overcome retention of urine, and in certain febrile affections, and according to Roxburgh the root is emetic. *Canthium parviflorum*, a common bush in India, has edible leaves, a decoction of which and of the root is given in certain stages of dysentery, and the latter is also thought to have anthelmintic properties (*Ainslie*, ii. 63). Many species of *Palicourea* possess active qualities; St. Hilaire states that *P. marcgravii* is poisonous, and employed to kill rats and mice, (*Pl. us. Bras.* 231,) and Martius notices that the leaves of *P. longifolia*, *diuretica*, *officinalis*, *strepens*, &c., are active diuretics, and the root of *P. crocea* is emetic, and also that the leaves of *P. speciosa* is not only diuretic, but also antisyphilitic, but the decoction in over-doses acts like a poison. The same writer states that the roots of *Geophila reniformis* and *macropoda* are good substitutes for Ipecacuanha, as are also those of *Borreria ferruginea* and *poaya;* the leaves of the latter are first sweet, but afterwards acid, and a decoction of them is used in colic.

Order 59.—RUBIACEÆ.—*Jussieu.*

Calyx superior, obsolete, or 4—5—6-lobed. Corolla monopetalous, valvate, rotate, or tubular, inserted on the calyx; lobes equal in number to those of calyx. Stamens equal in number to the divisions of the corolla, and alternate with them. Ovary peltate, or 2-celled. Ovules solitary, erect. Styles 2. Stigma simple. Fruit a didymous, indehiscent pericarp with 2 cells and 2 seeds. Seeds erect or peltate, solitary. Embryo in the axis of a horny albumen.

The species are principally natives of the northern hemisphere, or of the mountainous regions to the south of the equator. They do not afford many species of importance to the arts or medicine. They are all herbaceous, with verticillate leaves and angular stems. It is generally considered by botanists that they are destitute of stipules; but Mr. Bentham has shown (*Botanist*, 82) that part of the so-called leaves are in fact stipules. This, however, is combated with much skill by Dr. Lindley, but is in fact a mere difference about words, since leaves are only developed stipules, and stipules rudimentary leaves.

Rubia.—*Linn.*

Tube of the calyx ovate, globose; limb almost wanting. Corolla rotate, 5-cleft. Stamens short. Styles 2, short. Fruit didymous, somewhat globose, baccate, juicy.

A genus of suffruticose or herbaceous plants, with much-branched, square stems, verticillate leaves, and small, white or ochroleucous flowers. It contains about forty species, some of which are of much interest, but rather for their use in the arts than as medicinal agents.

R. TINCTORUM, *Linn.*—Herbaceous. Leaves 4—6, in a whorl, subpetiolate, lanceolate, smooth above. Margin, midrib, and angles of the stems aculeate, scabrous. Peduncles axillary, trichotomous. Lobes of the corolla gradually callous, acuminate, not cuspidate.

Linn., *Sp. Pl.* 158; Woodville, i. 173; Pereira, *Elem. Mat. Med.*, ii. 469; Lindley, *Fl. Med.* 446.

Common Names.—Madder; Dyer's Madder, &c.

Foreign Names.—Garance, *Fr.;* Robbia, *It.;* Krappwurzel, *Ger.*

Description.—Root perennial, composed of numerous long fibres, of various sizes, and united to a common head. Stems many, slender, quadrangular, jointed, decumbent, and furnished at the angles with short prickles, by means of which they can climb on a support. The leaves are from four to six in a whorl, elliptical, acuminate, rough on edges and midrib. The flowers are small, yellow, and terminal, forming a ramose panicle. The corolla is rotate, 4-cleft, with the lobes somewhat callous. The stamens are short, as are also the styles. The fruit is a round, shining berry, or rather double berry, one of which is abortive.

Madder is a native of the South of Europe, and is extensively cultivated in France and Holland, and has succeeded very well in this country; but the principal supply comes from Holland. The root, which is the only part used, is not dug up till the plant is three years old. As found in commerce, it is in long, cylindrical pieces, about as thick as a quill, and of a deep-red or brown colour. They consist of a thin epidermis, covering an easily separable cortex, and a ligneous meditullium, which is at first yellow, but on drying becomes reddish. It is generally, however, imported in the form of a coarse powder, which is brownish-red, of a peculiar but feeble nauseous odour, and a bitterish, astringent taste. It imparts these properties, as well as a red colour, to water and alcohol. Many analyses have been made of it, the most interesting of which are those by Robiquet and Colin (*Ann. Chim.* xxxiv.), and more recently by Runge (Thomson, *Records of Sci.*, ii. iii.) The last chemist states that there are no less than five colouring matters in Madder, two of which, *Alizarin* and *Purpurin*, had been noticed by Robiquet and Colin, and another, *Xanthin*, by Kuhlmann. Runge also mentions that two acids exist in it, which he has called *Madderic* and *Rubiacic*. The colouring matters are probably all modifications of a single substance, which appears to be the Xanthin, as at first the juice of the root is yellow, and does not change to a red until it has been acted upon by the oxygen of the atmosphere. Madder also contains a saccharine matter, and some resin. Its great employment is in the arts, as the basis of red dyes, as it affords a tint that is not affected by the action of light or moisture, when properly fixed by appropriate mordants.

When taken into the stomach, the colouring matter is absorbed, and tinges the urine and other secretions, and, from experiments on animals, also the bones, of a red colour, though none of the other tissues are affected by it. Many theories have been proposed to account for this curious fact; but none of them are satisfactory.

Medical Properties.—Madder was employed by the ancients, and is noticed by Hippocrates, Galen, Dioscorides, and others, as a potential remedy in diseases requiring the production of diuresis; and also as of much use in jaundice and visceral affections; but the experience of modern practitioners is, that it is wholly inefficient in these cases, and that its only striking action

on the system is as an emmenagogue; and even this is denied by many writers of high standing, among others by Cullen. On the other hand, Home (*Chir. Exper.*) speaks highly of it, in large doses; and Dr. B. S. Barton states it exercises considerable effects on the uterus, and that it is worthy the attention of practitioners. Herz (*Jour. de Med.*) also eulogizes it, but considers that it is rather suited to cases of retention than of suppression of the menses. To this may be added the testimony of the late Dr. Dewees, who says, that if given near the period at which the flow should take place, it is more decidedly useful than any other of the emmenagogue medicines; and also, that it may be given more safely than others, as it has no exciting power on the system generally (*Dis. Females*, 74–81).

It is given in powder, in doses of half a drachm to two drachms, several times a day, or, as advised by Dr. Dewees, in a decoction made with a pint of boiling water, poured on an ounce of the powdered root and a scruple of bruised cloves, and gently simmered for a quarter of an hour; when cool, strained off. The dose is a wineglassful every three hours.

Several other species of Rubia are used, especially in the arts; and one of the *R. cordifolia*, a native of Nepaul, is employed by the Hindoo practitioners as an aperitive and emmenagogue, and also as a deobstruent in cases of scanty lochial discharge after childbirth (Ainslie, *Mat. Ind.*, ii. 182).

Group XXIV.—Valerianales.

Order 60.—VALERIANACEÆ.—*Lindley.*

Limb of the calyx 2—4-toothed, obsolete, or else forming a kind of pappus. Corolla tubular or funnel-formed, sometimes with a spur at base, 4—5-lobed. Stamens distinct, usually fewer than the lobes of the corolla. Ovary with one perfect cell, and two abortive ones. Seeds suspended.

A small but widely diffused order of mostly extra-tropical plants, composed of annual or perennial herbs, with opposite exstipulate leaves. Flowers generally in cymes or panicles. The roots of the perennial species generally odorous, and are antispasmodic and anthelmintic.

Valeriana.—*Linn.*

Limb of the calyx involute during flowering, then unrolled into a deciduous pappus, of many plumose setæ. Tube of the corolla ob-conical or cylindrical, equal at base, or gibbous, without a spur, limb 3—5-cleft. Stamens 3. Fruit indehiscent, 1-celled, 1-seeded.

This is an extensive genus of herbaceous species found in almost every part of the world, but principally in temperate climates, or if in tropical regions, usually on mountains at some considerable elevation. The leaves differ exceedingly in form, even varying on the same plant. The flowers are usually white, sometimes rose-coloured, bluish or yellow.

V. officinalis, *Linn.*—Smoothish, erect. Stem furrowed. Leaves all pinnate, leaflets lanceolate, serrate, nearly equal. Fruit smooth.

Linn., *Sp. Pl.* 45; Woodville, i. 77; Stokes, *Mat. Med.* i. 96; Stephenson and Churchill, i. 54; Lindley, *Fl. Med.* 471.

Common Names.—Wild Valerian; Capon's tail, &c.

Foreign Names.—Valeriane sauvage, *Fr.;* Amantilla; Nardo salvatico, *It.;* Wilde Valdrianwurzel, *Ger.*

Description.—Root a short tuberculated rhizome from which issue many long, slender fibres of a dusky-brown colour. The stem is erect, hollow, smooth, furrowed, about three or four feet high. The leaves are of a deep glossy green, serrated, somewhat hairy beneath, opposite, pinnate, but differing in the number of leaflets. The lower leaves generally are furnished with ten pairs, those of the stem with nine, and the upper ones with from five to seven. The radical leaves are larger and have long petioles. The flowers, which are small and of a reddish-white colour, are in dense corymb-like panicles, terminal and perfect. The calyx is a mere border finally expanding into a kind of pappus to the seed. The corolla is tubular with a protuberance at base, and is divided into five obtuse segments. The stamens are three, subulate, with oblong yellow anthers. The ovary is inferior, oblong, and supports a filiform style, terminated by a trifid stigma. The seeds are oblong-ovate, compressed and crowned with a setaceous pappus of ten rays.

The Wild Valerian is a tall perennial, found in many parts of Europe in damp places, flowering from June to August, and is cultivated to some extent in England. It was for a long time supposed to be the plant mentioned by Dioscorides, but Dr. Sibthorp states that the Valerian of the ancients was another species, which he has figured and described under the name of *V. Dioscoridis*, and he says that it has a much more pungent and durable, though not as unpleasant an odour, as the *V. officinalis*. The part used in medicine, is the root; this, as found in commerce, consists of numerous long, slender, cylindrical fibres, attached to a rough tuberculated head, often with part of the stem attached. There are, however, several varieties used under the name of Valerian, all differing somewhat in their appearance and derived from different species, especially the *V. phu* and the *V. dioica*. The best is the English, which is exclusively the product of the plant under consideration. The colour of the dried root is externally yellowish or brown, and internally white. The powder is yellowish-gray. The odour is powerful and peculiar and extremely unpleasant to some persons, whilst to others it is agreeable. Cats are extremely fond of it, and the smell produces a kind of intoxication in them. The taste is bitterish, subacrid and aromatic.

Valerian yields its active properties both to water and alcohol. Its composition according to Tromsdorff is Volatile oil, a peculiar Resinous extractive, Gummy extractive, Resin, &c. The volatile oil, which is the efficient principle, exists in small quantity, and is of a yellowish or pale-green colour. If the acid oil first obtained on distillation be mixed with magnesia and again distilled, the pure oil passes over, and the magnesia unites to the acid, which is called the Valerianic. The acid and its salts, especially that of zinc, have of late years attracted some attention as antispasmodics, but there is no evidence to show that they are more efficient than the oil.

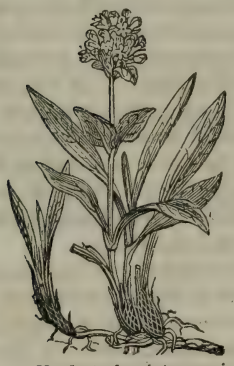
Medical Properties.—Valerian acts with some energy on the cerebro-spinal system, but its effects are not constant, as in some constitutions, it operates as a powerful stimulant and antispasmodic, whilst the same doses in others scarcely make any impression. It is, however, in very general use as a nervous excitant and antispasmodic, though in much more repute formerly than at the present day, except in Germany, where it is deemed one of the most powerful of the nervous stimulants. It has been celebrated in epilepsy, and many cases are related in which it proved beneficial, but like everything else in this inexplicable disorder, the failures with it have been far more numerous than the cures. In cases of hysteria it is certainly beneficial, and oftentimes very prompt in its effects. The best mode of administration is in the form of the ammoniated tincture, the dose of which is from a drachm to two drachms. It is also given in powder in doses of a scruple to a couple of drachms, or in infusion, which latter form is to be prepared. Dr. Cullen is of opinion that the roots of those plants which grow in a dry

elevated soil are far more efficient than those from low and damp situations; in this he is supported by most of the authorities.

Besides the *V. officinalis*, the roots of other species are constantly used, and in this market what is called the German Valerian is as common as the English; this is the product in a great measure of the *V. phu*, and may be known by the rhizome being long and not a mere head like that of the *V. officinalis*, and the fibres being attached to its under surface only. It is said to be less powerful, but is more disagreeable, though it is much employed. It is indigenous to hilly districts in Switzerland, Silesia, &c. The roots of the *V. dioica*, *V. celtica*, *V. saliunca*, and other species are also used, and are sometimes mingled with those of the officinal kind. *V. dioscoridis*, a native of Greece, is said by Sibthorp to be the real *Phu* of Dioscorides, and to be the most powerful of the Valerians, for which the *V. officinalis* is merely a northern substitute. The root of *V. hardwickii* is thick, fleshy, and strong-scented, and is used in medicine in Nepaul and the North of India.

In addition to these species of *Valerian*, there are some other plants of the order that require notice. The root of *Nardostachys jatamansi* is thought to be the true Spikenard of the ancients, and the proofs adduced on this point by Sir Wm. Jones (*Asiat. Research.* ii. 405) and by Dr. Royle (*Illust.* 242) seem to leave little doubt upon the subject. The root is long, pilose and fusiform. Stems very short. Leaves obovate-lanceolate. Flowers triandrous, of a pale-pink colour. It is found in mountainous districts in upper India. The hairy portion of the stem when dried, is used in India to prepare an ointment or liniment for the head, it is also prescribed internally as a purifier of the blood, and is considered as a highly valuable perfume.

Fig. 178.



Nardostachys jatamansi.

The young leaves of many of the species of *Valerianella* are used as salads, under the name of Corn salad. Some kinds of *Astrephia* are esteemed in Peru and Chili as vulneraries. The *Axia cochinchinensis* is said by Loureiro (*Flor. Cochin.* i. 44), to be much valued for medicinal powers, and thought equal to Ginseng. It acts as a diuretic, sudorific, and emmenagogue, and is also used in intermittent fevers and obstructions of the viscera.

Group XXV.—Asterales.

Order 61.—ASTERACEÆ.—*Lindley.*

Flowers collected in a dense head, upon a common receptacle, surrounded by an involucrum, the separate flowers often furnished with bracteoles (paleæ). Limb of the calyx obsolete, or a pappus consisting of bristles or scales, &c., tube coherent to ovary. Corolla mostly of 5 united petals, regular or irregular. Stamens as many as the lobes of the regular corolla and alternate with them; filaments distinct or united above, inserted into the tube; anthers linear, united into a cylinder. Ovary 2-celled, style 2-cleft (usually undivided in sterile flowers). Fruit an indehiscent, dry, 1-seeded pericarp (achenium), crowned with the limb of the calyx or pappus.

This vast order, which includes almost a tenth of the vegetable kingdom, consists of shrubs or herbs, very rarely of trees, found in all parts of the

world. When the immense number of species is considered, the useful ones are comparatively few; their general characteristics are bitterness and astringency, but their properties vary much. According to De Candolle (*Collec. Mem.* No. x.) of 8523 plants of this order with which he was acquainted, 1229 were annuals, 243 biennials, 2491 perennials, 2264 suffruticose, 366 shrubs, 72 small trees, 4 large trees, 81 woody plants, size not known, 126 climbers, and 1201 respecting which little was ascertained. They are distributed as follows: 3590 in America, 2224 in Africa, 1827 in Asia, 1042 in Europe, and 347 in the South Sea Islands. As is computed by M. Lasegue, they constitute about one-tenth of all known plants.

Besides the species to be noticed more at length, the following deserve mention. The flowers of *Santolina fragrantissima* are very odorous when dry, and are employed in Egypt as a substitute for Chamomile. *S. incana* is used in the South of Europe as an antispasmodic and bitter, and according to Dr. Pierquin is an infallible vermifuge (*Jour. de Prog.* xv. 265). *Matricaria chamomilla* and *Pyrethrum parthenium* are sometimes substituted for Chamomile, but are not equal to it in power, and are more unpleasant to the taste. The *Chrysanthemum leucanthemum* has also been used for the same purpose, and is esteemed in Siberia to be efficacious in leucorrhœa. Cantraine (*Bull. Acad. Brux.* viii. 234) states, that it is a certain safeguard against fleas, destroying or driving them off in a short time. *Donoricum pardalianches* is very analogous in its properties to *Arnica*, and is spoken of in high terms by Gesner, Lobel, &c. The leaves of *Elephantopus scaber* are prescribed in India as sudorific (*Ainslie*, ii. 18), and in Brazil, according to Martius, the root is used in intermittent fevers. Some of the Asters, as *A. cordifolius*, *punicens*, &c., which have aromatic roots, are said to be antispasmodic; *A. novangliæ* is used by the Shakers as an external application, in decoction, to cutaneous eruptions. Several species of *Baccharis* have been thought well of; thus *B. indica*, according to Horsefield, is used in Java as a stimulant (*Ainslie*, ii. 173), and the *B. ivæfolia*, is considered in Peru to be a stomachic. Many species of *Nabalus* have a reputation as antidotes to snake-bites, and the root is also used in dysentery. Some species of *Silphium* afford a fragrant bitter gum, which is stimulant and antispasmodic. The roots of *Verbesina virginica*, in decoction, are a powerful sudorific, and those of *Vernonia* are bitter tonics employed in the Western States in fevers. A plant has been noticed by Dr. Robertson (*Amer. Jour. Med. Sci.* xii. 382, N. S.), which appears to be *Ambrosia trifida*, as highly beneficial in arresting excessive salivation.

Carlina vulgaris at one time enjoyed considerable reputation in plague, as a powerful sudorific, and is said also to be diuretic; the root is bitter and acrid and acts on the bowels. Another species, the *C. gummifera*, has been used as an anthelmintic; the fresh root is said to be poisonous. What is sold in Europe as *Costus* is the root of an Arabian plant allied to *Cardopatum*, but it has been ascertained by Dr. Falconer that the Costus of the ancients is the root of *Aucklandia costus*, a native of the mountains of Cashmere. The roots are aromatic and pungent and are considered to be aphrodisiac. It is used in Cashmere to protect woollens from the attacks of moths.

Some of these plants are used in the arts; besides *Carthamus*, *Serratula tinctoria* affords a yellow; the *Eclipta erecta* stains the hair black. *Guizotia oleifera*, *Madia sativa*, and *Helianthus annuus* furnish a bland oil from their seeds, which is palatable and wholesome.

Nor is the order deficient in esculents; for instance, the tubers of *Helianthus tuberosus*, or Jerusalem artichoke, are much esteemed by some persons. The true artichoke is the succulent receptacle of *Cynara scolymus*, and Cardoons

the leafstalks of *C. cardunculus*. Among the more common culinary vegetables are *Tragopogon porrifolius* or Salsify, *Chicorium endivia* or Endive, *C. intybus* or Succory, the root of which is used so largely to adulterate coffee; *Lactuca sativa* or Lettuce, &c.

The Asteraceæ are divided into sub-orders: 1. *Tubuliflorœ;* 2. *Labiatiflorœ;* and 3. *Liguliflorœ.*

Fig. 179.

Sub-orders of Asteraceæ.
1. Liguliflorœ. 2, 3. Tubuliflorœ. 4, 5. Labiatiflorœ.

1. Tubuliflorœ. Corolla tubular and regularly 4—5-lobed, either in all the flowers, or in the central ones only; those of the margin presenting a ligulate or strap-shaped corolla.

Tribe 1. Eupatorideæ.—Style of the perfect flowers cylindraceous; branches or lobes elongated, obtuse or clavate, externally pubescent or papillose towards the summit; stigmatic lines obscure, terminating near the middle. Anthers never caudate.

Liatris.—*Schreber.*

Heads few, many-flowered. Scales of involucre few or numerous, imbricate not striate. Receptacle naked. Corolla tubular, 5-lobed, lobes usually elongated. Branches of style much exserted, cylindraceous, obtuse. Achenia nearly terete, tapering to the base, about 10 ribbed. Pappus of 15—40 plumose or barbellate bristles.

A large genus of North American herbs, mostly with simple stems and a tuberous root, and alternate or scattered, usually lanceolate or linear and entire leaves, with a rigid margin. The heads of flowers are in a long spike or raceme, rarely corymbose; they are usually of a purple colour, but sometimes white. The root in a large proportion of them is a naked tuber, imbued with a terebinthinate substance. A number of them have been indiscriminately employed as medical agents, especially in domestic practice, and

as it is impossible to say which of them is to be preferred, one of the most common is therefore selected.

L. SQUARROSA, *Willdenow.*—Stem simple, pubescent; leaves linear, very long; raceme few-flowered, leafy; calyx large, about 20-flowered, scales leafy, lanceolate, mucronate, rigid and spreading; lobes of the corolla linear, villous internally.

Willdenow, *Sp. Pl.* iii. 1635; Torrey and Gray, *Fl.* ii. 68; Elliott, *Sketches*, ii. 282; Lindley, *Fl. Med.* 450.

Common Names. — Blazing Star, Button Snake-root; Rattlesnake's Master.

Description.—Stem 1—3 feet high, often nearly glabrous, sometimes almost hirsute; very leafy; leaves linear, elongated, rigid, the lower ones 3—5-nerved, the radical very long. The heads of flowers few, sometimes solitary, sessile or on very short pedicels, many-flowered. The scales or paleæ are rigid, ciliate, with more or less elongated and pointed foliaceous extremities. The flowers are bright purple, with the lobes of the corolla hairy within. The achenia are minutely pubescent and the pappus is very plumose, having eighteen to twenty bristles, often of a purplish colour.

This species grows in dry, barren, or sandy soil, in almost every part of the United States, flowering from July to September. It has a tuberous root, which is the part used, furnished with a great number of long, slender, whitish fibres. This root has an acrid, bitterish, pungent taste, and an aromatic, terebinthinate odour, which properties are owing to the presence of a peculiar balsamic substance; the qualities are partly given out to water, but are wholly so to alcohol. No analysis has been made of it, nor of any of the species, and it is therefore impossible to decide on the exact nature of the active ingredient, nor have they been subjected to a proper trial with regard to their therapeutic powers, though they have attained much celebrity in many parts of the country, and for many purposes, particularly for their alexipharmic powers in bites of venomous snakes.

Medical Properties.—The best ascertained quality of this and the other tuberous-rooted species, is their diuretic property. This was noticed by Schoepf, who found them in use among the Indians for this purpose, and Dr. B. S. Barton speaks of them under the name of *Serratula*, as very useful in nephritic complaints, and in venereal diseases; he quotes the testimony of several practitioners in favour of their virtues in these affections. The belief in their powers in the cure of persons bitten by venomous snakes, is very general; Pursh states that the *L. scariosa* and *L. squarrosa* are known to the inhabitants of Virginia, Kentucky, and Carolina, by the name of "Rattlesnake's master," and goes on to say, "that when bitten by the animal, they bruise the bulbs of the plants, and apply them to the wound, while at the same time they make a decoction of them in milk, which is taken inwardly." (*Pursh*, ii. 509.) Riddell (*Synop. Flor. West. States*), in noticing these plants, cites them as stimulant, carminative, and diaphoretic, and used for these purposes by the Thomsonians.

From what has been said, it is evident that these roots are possessed of active properties, and that they deserve a fair trial, so that their true value may be ascertained, and whether they deserve a place in the Materia Medica.

EUPATORIUM.—*Linn.*

Heads 3- to many-flowered. Involucre cylindrical or campanulate, the scales imbricated in 2—3 or more series, or sometimes nearly even in a single series. Receptacle flat, naked. Corolla tubular, funnel-shaped, or with a campanulate limb; 5-toothed, fre-

quently dilated at base. Anthers included. Branches of styles mostly exserted and elongated, cylindraceous, obtuse. Achenia 5-angled, without intermediate striæ. Pappus a single series of very slender capillary bristles, scabrous or minutely serrulate.

An extensive genus of perennial herbs, or somewhat shrubby plants, the larger portion American, with opposite, or sometimes alternate or verticillate, simple or rarely-divided leaves. Flowers generally in corymbs, of a purple, white, or blue colour, and with the leaves often covered with resinous dots. Most of the species are bitterish and diaphoretic, and several of them are officinal.

E. PERFOLIATUM, *Linn.*—Stem villous, hirsute, cylindrical; leaves opposite, connate-perfoliate, oblong, tapering, acute, serrate, rough above, tomentose beneath; heads about 10-flowered.

Linn., *Sp. Pl.* 1174; Torrey and Gray, *Fl.* ii. 88; Barton, *Veg. Mat. Med.* ii. 125; Bigelow, *Med. Bot.* i. 33; Rafinesque, *Med. Flor.* i. 174.

Common Names.—Boneset; Thorough wort; Fever wort, &c.

Foreign Name.—Eupatoire perfoliée, *Fr.*

Fig. 180.

E. perfoliatum.

Description. — Root perennial, horizontal, crooked, sending up many erect stems, which are simple at base, branched above, round, hairy, of a grayish-green colour. The leaves are opposite, connate or perfoliate, decussating, gradually tapering to a point, serrated, rough above, and tomentose beneath, of the same colour as the stalks. The upper leaves and those of the branches are merely sessile. The flowers are in dense, depressed, terminal corymbs, formed of smaller, fastigiate ones; the peduncles are hairy as well as the common calyx, each of which contains from twelve to fifteen florets. Scales lanceolate, entire. Florets tubular, 5-toothed, white. Anthers deep-blue or black, united into a tube. Seeds black, prismatic, acute at base, on a naked receptacle. Pappus with scabrous hairs.

There are several varieties, distinguished by greater or less pubescence of the leaves, and a striking one in which the leaves are ternate; this is far from being uncommon in the vicinity of Philadelphia; in some localities it is more plentiful than any other. The Boneset is abundant in low grounds, and on

the margins of streams in every part of the United States, sometimes in the greatest profusion. It flowers in August, and continues in bloom until October. The whole plant is used, and is generally found in the shops in packages put up by the Shakers; these contain the leaves and flowers, and when not deteriorated by damp, are a good mode of preparing the article. Some difference of opinion has existed as to which part of the plant was most efficient. Dr. Anderson (*Diss. Inaug.*) thought from his experiments, that the leaves were the most active; in this he is supported by Dr. Chapman and others, but more extended observations have shown that the flowers and small branches are fully as useful. No accurate analysis of this plant has been made. Dr. Bigelow made an examination of it some years since, which showed that the leaves and flowers abound in a bitter extractive matter, which is probably the active principle. It is soluble in water and alcohol, and forms copious precipitates with the metallic salts. Rafinesque speaks of a peculiar brown, bitter, resinous principle in it which he terms *Eupatorine*, but does not state by whom it was detected. The odour of Boneset is agreeable, and its taste bitter but unpleasant.

Boneset was known to the Indians, and held in much estimation by them for its febrifuge properties; from them the early settlers derived their knowledge of its virtues, and it became a favourite remedy in domestic practice, long before it attracted the attention of the profession.

Medical Properties.—These are various, and it has been employed to fulfil a number of indications, being given as a tonic, a diaphoretic, or an emetic, as the circumstances of the case might require. Besides these, many others have been attributed to it, but without much foundation; if one-half that has been advanced respecting the curative powers of this article were to be credited, it would deserve the name of a universal panacea. It is certainly a highly important remedy when properly administered, but by no means endowed with the high powers that have been attributed to it.

As an emetic, it is given in warm decoction, and is considered by Dr Ives as valuable in the early stage of autumnal fevers, but it is uncertain in its operation on the stomach, and does not deserve to rank higher than the infusion of chamomile. In large doses it is said to act on the bowels, and Dr. Thacher states "that it has long been esteemed as an efficacious remedy in bilious colic, accompanied by obstinate constipation, in the dose of a teacupful every half hour, until a cathartic effect is produced." As a diaphoretic, there is ample testimony of its powers, particularly in catarrhal affections; and Dr. Anderson speaks of it in high terms in various forms of fever, in which he is fully sustained by the testimony of many distinguished practitioners. From an extensive use of it, I have been led to look upon it as an extremely important auxiliary in the treatment of these complaints, but that it should not be relied upon to the exclusion of other, and more efficient articles.

As a tonic, it is also deserving of notice, and is well suited to those cases of dyspepsia, and want of tone in the system, requiring the exhibition of the simple bitters. When given with this view, the best form is the cold infusion. It has been highly praised in the treatment of some cutaneous affections, but has not been found as efficacious as has been stated. Dr. W. P. C. Barton states that it proved of no value in his hands in obstinate eruptions; on the other hand, Dr. Zollickoffer found it eminently successful in Tinea capitis, given in combination with Cremor Tartar.

It is given in powder in doses of ten or twenty grains, and in infusion made with an ounce of the herb to a pint of boiling water, in those of two or three ounces.

Two other native species are officinal in the U. S. Pharmacopœia, the *E.*

purpureum, or Gravel root, and the *E. teucrifolium*, or Wild Horehound. The first of these, as its common name indicates, has obtained some celebrity as a diuretic in diseases of the kidneys and bladder, and the latter is spoken of highly as a diaphoretic, diuretic, and tonic, in febrile complaints, by Dr. Jones of Georgia. They do not, however, appear to possess any powers differing from the *E. perfoliatum*. *E. cannabinum* of Europe, was at one time in high repute as a deobstruent, but the recent experiments of Deslongchamps and others show that its therapeutic powers are very slight. The *E. ayapana*, a native of Brazil, was also considered entitled to a conspicuous rank as an alexipharmic and febrifuge, but ample trials of it have proved that it deserves no higher rank than the other species already mentioned.

Mikania.—*Willdenow.*

Heads mostly 4-flowered. Receptacle naked, narrow. Scales of the involucre 4—5. Corolla dilated, or campanulate at the summit, 5-toothed. Anthers partly exserted. Achenia angled. Pappus in a single series, capillary, scabrous.

A genus of shrubby, or herbaceous, and usually climbing plants, mostly peculiar to tropical America, with opposite, commonly cordate leaves, but varying much. Heads corymbose, panicled, or spicate. Flowers whitish. They are very closely allied to Eupatorium, both in their sensible and medicinal properties, and would not require notice, were it not that one of the species attracted much attention some years since as a remedy in malignant fevers, cholera, &c.

M. guaco, *Humboldt and Bonpland.*—Stem twining, branches terete, sulcate, hairy; leaves ovate, subacuminate, somewhat narrowed at base, remotely dentate, rough above, hairy beneath; corymbs axillary, opposite; flowers subternate, with linear bracteoles; achenia smooth.

Humboldt and Bonpland, *Pl. Æq.* ii. 84; Kunth, *Nov. Gen. Am.* iv. 136; De Candolle, *Prod.* iv. 193; Lindley, *Flor. Med.* 452.

Common Names.—Guaco; Huaco.

Description.—Stem twining. Branches round, sulcate, hairy. Leaves petiolate, ovate, somewhat acuminate, shortly narrowed at base, remotely toothed, reticulate, roughish above, hairy beneath. Corymbs axillary, pedunculate, opposite. Heads somewhat ternate, sessile. Bracteoles linear, shorter than the involucre. Involucral scales linear, oblong, obtuse, downy. Achenia smooth.

The part used is the leaves, and it is stated that they should be employed in a fresh state, as desiccation deprives them of much of their power. According to M. Faure, those met with in commerce are usually injured both by want of care in drying them, and by heating during the voyage. This chemist made an analysis of the dried leaves, and found them to contain: a Fatty matter analogous to wax, Chlorophylline, a peculiar Resin, which he calls *guacine*, Extractive and astringent matter analogous to tannin, &c. The guacine, from his account of it, appears to be very analogous to the resinoid substance found in the Eupatorium. The taste of the leaves is bitter, and in a fresh state their odour is strong and disagreeable.

Medical Properties.—The Guaco has long been known to the natives of South America, and is highly esteemed by them as an antidote against the venom of serpents. For this purpose, the expressed juice of the leaves, or a strong infusion of them, is taken, and the crushed leaves applied to the wound. In corroboration of its good effects in such cases, Mutis states that he has been a personal witness of its curative powers, in the bites of the most venomous species of serpents; and his testimony is supported by that of Bertrero. To

be successful, it must be employed in a fresh state, but even when dried, it is also considered as a powerful febrifuge, anthelmintic, &c.; and some years since was spoken of in the most unequivocal manner as a certain cure in yellow fever, cholera, and even in hydrophobia, and cases were cited of its wonderful powers in these diseases; but as might have been expected, a trial of it at once disproved the truth of these extravagant assertions, and proved that it was possessed of much the same properties as the Eupatorium. At the same time, there can be no doubt that it has proved highly beneficial in numerous cases of severe disease, and it well deserves a further trial, that its exact influence on the system may be ascertained. Dr. Hancock denies any virtues to it, and is of opinion that the real Guaco is some species of *Aristolochia*.

Two other species are also reputed very efficacious in Brazil. *M. officinalis*, called by the natives *Coraçoa de Jesu*, is bitter and aromatic, and is said to be particularly beneficial as a febrifuge, and in weak digestion. (Chernoviz, *Form.* 156.) *M. opifera*, or *Erva da Cobra*, is used internally and externally as an alexipharmic, when it is said to prove remedial from its powerful diuretic action.

Tussilago.—*Linn.*

Head many-flowered, heterogamous; florets of the ray in many rows, pistillate, narrowly ligulate; of the disk few, staminate, with a campanulate, 5-toothed limb. Receptacle naked. Anthers scarcely caudate. Scales of involucre oblong, obtuse, in about one row. Styles of the disk included, sterile, of the rays bifid, with terete branches. Achenia of the ray, oblong, cylindrical, smooth; of the disk abortive. Pappus of the ray-florets in several rows, of the disk in one series, capillary.

This genus, as now constituted, contains but a single species; the others formerly considered as appertaining to it, being either varieties, or belonging to other genera.

T. farfara, *Linn.*—The only species.

Linn., *Sp. Pl.* 1214; Torrey and Gray, *Fl.* ii. 93; Woodville, i. 45; Stephenson and Churchill, i. 20; Lindley, *Fl. Med.* 453.

Common Name.—Colts-foot; Horse-hoof, &c.

Foreign Names.—Pas d'ane, *Fr.*; Farfara, *It.*; Fluflattish, *Ger.*

Description.—Root perennial, long. Leaves radical, cordate, on furrowed petioles, somewhat lobed and toothed, smooth above, white and tomentose beneath; when young, the leaves are revolute, and covered with a cottony down. The scapes, which are several, appear before the leaves; they are erect, slender, round, and beset with numerous lanceolate scales. Their colour varies from pale-green to reddish-brown; they are one-flowered. Flower bright yellow, with the scales of the involucre linear-lanceolate, equal to the disk, at first erect, but finally reflexed. The inflorescence is compound, the florets of the ray being ligulate, numerous, and fertile, whilst those of the disk are few, tubular, and barren. The achenia are smooth, oblong, and compressed. The pappus is pilose, sessile, silvery, and permanent.

The Coltsfoot is very common in Europe, and has become naturalized in some parts of this country, more especially in the Northern States. It grows in wet places and low meadows, flowering early in the season. The generic name is derived from *tussis* and *ago*, in allusion to its pectoral powers; and the specific one, from the resemblance of its leaves to a kind of poplar, called by the ancients *Farfarus*. It was well known to the earlier writers on the Materia Medica, as it is spoken of by Hippocrates as a remedy in ulcerations of the lungs, and by Dioscorides, Pliny, and Galen as an excellent remedy,

when smoked through a reed, to relieve obstinate coughs. The leaves, flowers, and root, are all used. The two former are inodorous, and have a rough, sub-viscid taste. The root is mucilaginous and bitter. No analysis has been made of them.

Medical Properties.—The most prominent qualities of the Coltsfoot, are those of an emollient, demulcent, and slightly tonic character. It was at one time in high repute in pulmonary diseases, and is still much employed in Europe as a popular remedy in these complaints. Old Gerarde says of it—"The fume of the dried leaves, taken through a funnel, burned upon coles, effectually helpeth those that are troubled with the shortness of breath." It is still retained in the London Pharmacopœia, but is seldom used by physicians. Dr. Cullen used the expressed juice of the leaves in scrofula, and was of opinion that it was of benefit; but a further trial of it, in such cases, has not confirmed its power. The quack medicine called "Essence of Coltsfoot," is a solution of some of the balsams in alcohol, and is highly stimulating, and unfit for the greater proportion of cases of pulmonary disease.

The Coltsfoot is administered in decoction, made by boiling a handful of the leaves in two pints of water down to a pint, straining and sweetening with honey or sugar. The dose is *ad libitum*. This decoction answers very well to allay tickling coughs, but is not superior to flaxseed tea or the other common demulcent drinks.

Tribe 2. ASTEROIDEÆ.—Heads heterogamous or homogamous. Style of perfect flowers cylindraceous. Branches flat or flattish; mostly linear or lanceolate above, equally-pubescent externally; conspicuous stigmatic lines, terminating where the exterior pubescence commences, not confluent. Leaves alternate or rarely opposite.

ERIGERON.—*Linn.*

Heads many-flowered. Ray flowers numerous, in more than one series, pistillate; those of the disk tubular, perfect; some of the exterior ones filiform-tubular and truncate, pistillate. Scales of involucre mostly equal, narrow, in a single or somewhat double series. Receptacle flat, naked, punctate or scrobiculate. Appendages of the style short and obtuse. Achenia compressed, usually pubescent, commonly with 2 lateral nerves. Pappus pilose, rough, of a single series of capillary bristles, or double, the outer series much the shortest.

An extensive genus of herbaceous plants, with entire, toothed or lobed leaves, and solitary, corymbose or paniculate flowers, of a white, blue, or purple colour. It is closely allied to some of the divisions of Aster, and there is much confusion as regards its sections, numerous genera being proposed to be taken from it by some writers, founded principally on the differences in the pappus, which, however, are not acknowledged by other authorities.

E. ANNUUM, *Persoon.*—Sparsely hirsute. Stem branched above. Leaves coarsely and sharply serrate-toothed; the radical and lowermost ovate, obtuse, tapering into a margined petiole; the others ovate-lanceolate, sessile, acute, and entire; the uppermost lanceolate, mostly entire. Rays very narrow, not twice the length of the sparsely setose-hispid involucre.

Persoon, *Synop.*, ii. 431; Torrey and Gray, ii. 175; *E. heterophyllum*, Barton, *Veg. Mat. Med.*, i. 231.

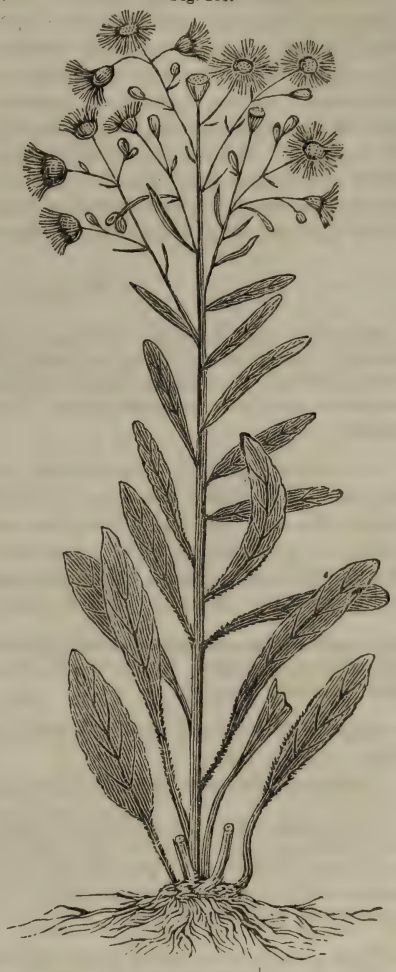
Common Names.—Flea-bane; Scavish; Sweet Scabious.

Description.—Annual or biennial. Stem stout, striate, roundish, pubescent, two to four feet high, much branched at top. Radical leaves ovate, acute, deeply-toothed, and

supported on broad-winged petioles. Stem-leaves sessile, lanceolate, acute, sinuate, or remotely serrate-toothed in the middle; those of the branches lanceolate, entire, sessile. Flowers in terminal, rarely lateral corymbs, numerous. The disk-florets are yellow, and those of the ray capillary, white or pale-blue.

This plant is common in most parts of the United States, and is now naturalized in Europe. It has been described by most writers under the name of *heterophyllum*, and is recognised by that appellation in the United States Pharmacopœia; but the specific name of *annuum* having the priority, must be adopted, and has been so by Persoon, Hooker, Torrey and Gray, and other distinguished botanists. It is very closely allied to the *E. strigosum* (*E. Philadelphicum*, Barton, *Veg. Mat. Med.*), and specimens may be found which might be referred to either species. They are also identical in their medical properties, and are employed indiscriminately. The whole plant is used, and should be gathered and dried during the flowering season. No analysis has been made of either of them. When bruised they have a peculiar but not unpleasant smell; their taste is astringent and bitter. An oil of a pale-yellow colour, of an acrid taste, is said by Rafinesque to have been obtained from them, as well as from the *E. canadense*, which possesses extraordinary styptic properties.

Fig. 181.



E. strigosum.

Medical Uses.—The most striking quality of the Erigeron is its diuretic power, for which purpose it has been used for a long time in domestic practice, and has proved highly successful in many cases in the hands of regular practitioners. It has been prescribed in complaints of the bladder and kidneys, with much relief to the patient, and has also proved useful in the various forms of dropsy, but cannot be relied upon as a curative means. In dysury, especially in children, it has been found very beneficial by Dr. Physick, and was a favourite remedy with Dr. Dewees in cases of difficulty in urinating in children. Dr. W. P. C. Barton likewise speaks of it in high terms, as relieving the painful micturition attendant on nephritis. It has also been given as a diaphoretic and emmenagogue, for which latter purpose it was employed by the Indians, who called it Squaw-weed. From all that can be gathered on the subject, it is evident that the Erigeron is a valuable remedy, and one that

deserves a more extended trial; and should the oil have the power of arresting uterine hæmorrhage, attributed to it, it will be a most valuable addition to the Materia Medica. As a diuretic, the plant is given in a strong decoction, which is to be taken very freely; and, as it does not disagree with the stomach, it may be administered where digitalis and squill would be rejected.

The properties of the *E. strigosum* are identical with the above; those of the *E. canadense* differ somewhat, being more tonic and astringent. Dr. De Puy, who made an examination of it, states that it contains Bitter extractive, Tannin, Gallic acid, and Volatile oil, which latter is acrid. It is from this species that the oil is principally obtained. The same writer states that this plant is useful in dropsical complaints and in diarrhœa, and may be given in substance, infusion, tincture, or extract. The Canada Flea-bane is as common as the other species, and is known in some parts of the country under the names of *Horse-weed*, *Butter-weed*, &c. It belongs to a different section of the genus, and may therefore vary in its medicinal properties. The whole subject, however, requires investigation, not only as to the remedial properties of the species, but also as to their chemical composition.

Solidago.—*Linn.*

Heads few, many-flowered. Flowers of disk tubular, perfect, those of the ray few or wanting. Scales of the oblong involucre imbricated, appressed, without foliaceous or herbaceous tips. Receptacle narrow, usually alveolate. Style appendages lanceolate. Achenia many-ribbed, somewhat terete. Pappus simple, of numerous scabrous capillary bristles.

An extensive genus of herbaceous perennials, most of the species of which are peculiar to North America. The stems are mostly strict or virgate, with sessile alternate cauline leaves; the radical never cordate. The flowers are yellow, in terminal or axillary racemes or clusters. The general character is that of mild astringency, combined, in one or two species, with some stimulating qualities, owing to the presence of an aromatic oil.

S. odora, *Aiton.*—Stem somewhat pubescent in lines, usually simple and declined. Leaves linear lanceolate, entire, smooth, with rough margins, and punctate with pellucid dots. Racemes panicled.

Aiton, *Hort. Kew.* i. 214; Torrey and Gray, *Flor.* ii. 219; Bigelow, *Med. Bot.* i. 188, t. 20.

Common Name.—Sweet Golden Rod.

Description.—Stem two or three feet high, slender, often bending. Leaves sessile, at length reflexed, linear-lanceolate, tapering to a point, with a prominent midrib, covered with small pellucid dots. Panicle usually secund. Flowers on slender pedicles, with subulate bracts. Scales of the involucre few, almost glabrous. Pappus shorter than the florets of the disk.

This plant is a native of most parts of the United States, in dry sandy soil, flowering in the autumn. It is remarkable for yielding a volatile oil on distillation, of an odour partaking of that of aniseed; this odour is perceptible on bruising the leaves.

Medical Uses, &c.—The leaves are stimulant, diaphoretic and carminative, and are said to be an agreeable substitute for tea. Pursh states that they are exported to Canton, where they bring a high price, but we have been unable to verify this assertion, and feel very doubtful of the accuracy of his information.

The oil is used as an external application in headache, but the best mode

of using it is in the form of essence, by dissolving it in spirit; in this state it is beneficially exhibited in complaints of the digestive organs, attended with flatulency, and from its aromatic flavour is well suited to disguise the nauseous taste of many medicines. It has been found useful in arresting vomiting and spasmodic pains in the stomach.

The *S. virgaurea*, a native of Europe and of the northern parts of America, was at one time in much repute in complaints of the genito-urinary organs, and was even supposed to have lithontriptic properties. Gerarde says of it: "It is extolled above all other herbs for the stopping of blood in sanguinolent ulcers, and bleeding wounds." Its true character appears to be astringent and tonic, and may be employed when a mild article of this class is required. It is probable that most of the species are possessed of analogous powers. Schoepf alludes to a species useful in wounds and snake-bites, and also in tumours, pains in the breast, &c.

Inula.—*Linn.*

Head many-flowered, heterogamous; florets of the ray pistillate, in one row, sometimes sterile by abortion, generally ligulate, rarely somewhat tubular and trifid; those of the disk hermaphrodite, tubular, 5-toothed. Involucre imbricated in several rows. Receptacle flat or somewhat convex, naked. Anthers with two setæ at the base. Achenium without a beak, tapering or angled. Pappus uniform, in a single series, composed of capillary rough setæ.

A genus of mostly perennial berbs, natives of Europe and Asia, with their cauline leaves often amplexicaul. The flowers are yellow, in solitary or corymbose heads. Several species have been used in medicine, but only one of them deserves notice.

I. HELENIUM, *Linn.*—Leaves large, velvety, tomentose beneath, denticulate; radical ones ovate, tapering to a petiole; the cauline partly amplexicaul; heads solitary at the summit of somewhat corymbose panicles.

Linn., *Sp. Pl.* 881; Torrey and Gray, *Fl.* ii. 267; Woodville, i. t. 26; Stephenson and Churchill, i. 49.

Common Names.—Elecampane; Horse Heal; Scabwort.

Foreign Names.—Auneé, Aulneé, *Fr.;* Enula Campana, *It.;* Alantwurzel, *Ger.*

Description.—Root thick, fusiform, branching and aromatic. Stem three or four feet high, thick, round, leafy, furrowed, solid, branched and downy towards the top. The leaves are large, ovate, slightly-toothed, of a dark-green colour above and hoary beneath; the radical ones are large, and petiolated, but those of the stem are sessile and clasping. The heads of flowers are large, radiated, solitary, terminal, of a bright yellow colour. The involucre is hemispherical, the outer scales are broad and imbricated, and downy on both sides; the inner are narrow, linear and chaffy. The disk-florets are numerous, perfect, tubular, 5-cleft; those of the ray are spreading, ligulate, linear, pistillate and trifid. The anthers are furnished with bristles at their base; the ovary is oblong with a filiform cloven style, and spreading obtuse stigmas. The seeds are quadrangular, smooth, and furnished with a simple pappus.

Elecampane is a native of Europe and Japan, and is naturalized in some parts of the United States, growing in moist places and about houses, flowering in July and August. Professor Alston is of opinion that it is the first Helenium of Dioscorides, and is also supposed to be the Inula of Pliny, who speaks of Helenium as a different plant; Horace also alludes to it. The part

used is the root, which as found in the shops is in longitudinal or transverse slices, of a yellowish-gray colour, with an aromatic and peculiar odour, and disagreeable bitter taste, with an after-sensation of heat. Both alcohol and water extract its virtues, but the former most so.

The root has been analyzed by several chemists, and found to contain a Volatile oil, a peculiar Camphor, Wax, acrid Resin, Gum, Bitter extractive, Inulin, &c. Inulin was first detected by Rose, but named by Dr. Thomson; Rose called it *Alantine*. It has also been detected in several other plants, and has been called *Menyanthin*, *Dahlin*, and *Datiscin*. It is an amylaceous substance, closely allied to starch.

Medical Properties.—Elecampane is an aromatic tonic and expectorant, and also acts as a diuretic and diaphoretic. It was at one time in high repute in a variety of disorders, but more especially in those of the pulmonary organs, but is seldom employed by the medical practitioner at the present day, though it still retains much reputation in domestic practice.

The following account of it by Dr. Short (*Med. Brit.*), will give an idea of the virtues attributed to it about a hundred years since. "The root is good for shortness of breath, cough, or asthma. It is a fine stomachic and promotes digestion. Its decoction or powder taken with sugar expels urine and the menses. Its infusion in white wine is good for green sickness, and its decoction cures bloody urine, and is proper in cramp, convulsions, and sciatica pains, &c."

It has proved beneficial in chronic catarrh, where there is much secretion of mucus, but no febrile symptoms, and also in dyspepsia, where there is debility and relaxation. It is sometimes allied in its action on the system to Calamus, but is not so stimulating. The dose of the powder is a scruple to a drachm; of the decoction, made with half an ounce of the root to a pint of water, one to two fluid ounces. In large doses it causes nausea and vomiting.

Tribe 3. SENECIONIDEÆ.—Heads heterogamous, homogamous, or heterocephalous. Style cylindraceous above, the branches linear, penicillate or hairy at the apex, either truncate or produced into a cone, or a more or less elongated and hispid appendage. The stigmatic lines terminating in the base of the cone or appendage, not confluent. Leaves opposite or alternate.

HELENIUM.—*Linn.*

Heads many-flowered, radiate; ray-florets in a single series, pistillate, cuneiform, ligulate, 3—5-cleft at summit, with scarcely any tube. Scales of involucre in a double series; the outer linear or subulate, foliaceous, spreading or relaxed; the inner few and shorter, chaffy. Receptacle convex, globose or oblong, naked. Florets of the disk with a short tube, and an inflated, cylindrical, 4—5-toothed limb. Branches of the style a little dilated and obtuse at tip. Achenia obovate-turbinate, striate or ribbed, villous on the ribs. Pappus of 5—8 membranous, apiculate, or awned scales.

A small genus of North American plants, with erect, branching stems, and alternate, decurrent leaves, which are minutely punctate. The flowers are usually yellow.

H. AUTUMNALE, *Linn.*—Leaves lanceolate, serrate, acute, very decurrent. Scales of involucre linear-subulate. Rays flat, 3—5-cleft at tip, longer than the disk.

Linn., *Spec.* ii. 866; Torrey and Gray, *Fl.* ii. 384; Barton, *Fl. Am. Sept.* t. 26; Rafinesque, *Fl.* i. 235, f. 47.

Common Names.—Sneezewort; Swamp Sun-flower.

Description.—Root perennial, fibrous. Stems several, one to three feet high, angular, branched, minutely pubescent. Leaves glaucous, alternate, sessile, decurrent, lanceolate, acuminate, unequally serrate, punctate. Flowers corymbose, of a bright yellow colour. Peduncles axillary, one-flowered, thicker above. Involucre with linear-acute scales. Disk semi-globose. Rays flat, cuneate, three to five-lobed. Pappus of five membranous, subulate, and awned scales.

Fig. 182.

H. autumnale.

The Sneezewort is found in damp grounds in most parts of the United States, flowering in September and October. It is ornamental, and usually grows in profusion when occurring. It has scarcely any smell, but a bitter, somewhat pungent, or acrid taste. No analysis has been made of it.

Medical Uses, &c.—It appears to be tonic and diaphoretic, and also is powerfully errhine. It is noticed by Clayton and Schoepf as useful in intermittents, but does not seem to be generally employed in domestic practice, but is very celebrated for its errhine properties. The whole plant acts as such, but the flowers, and especially the central florets, are the most active. Rafinesque states that Dr. B. S. Barton esteemed it highly as a substitute for the more acrid articles of the class. It is not equal in power to the *Asarum*, or the brown powder of the leaves of the *Kalmia*, but may be useful where these cannot be procured, in cases where such agents are required, which but seldom occur.

Maruta.—*Cassini.*

Heads many-flowered; the rays neutral, continuous with the sterile ovary. Scales of the hemispherical involucre imbricated in few series, shorter than the disk. Receptacle conical, chaffy throughout, or only at the summit. Achenia obovoid or ob-pyramidal, ribbed, glabrous, destitute of pappus.

A small genus separated by Cassini from Anthemis, and consisting of annual fetid herbs, with pinnately-divided leaves, and solitary heads terminating the branches. The flowers are yellow at the disk, with white rays.

M. cotula, *De Candolle.*—Scales of the involucre with whitish, scarious margins. Receptacle conical, chaffy at the summit, chaff subulate.

Linn. (*Anthemis*), *Sp. Pl.* 894; Barton, *Veg. Mat. Med.* i. 161; Rafi-

nesque, *Med. Flor.* i. 44; *Maruta cotula*, De Candolle, *Prod.* vi. 13; Torrey and Gray, *Fl.* ii. 408; Lindley, *Fl. Med.* 459; *M. fœtida*, Cassini, *Dict.* xxix. t. 174.

Common Names.—Wild Chamomile; May-weed; Dog Fennel, &c.

Foreign Names.—Maroute, *Fr.;* Camomilla mezzana, *It.;* Die stinkende kamille, *Ger.*

Fig. 183.

M. cotula.

Description. — Root annual, crooked, fibrous. Stem and leaves covered with short, adpressed woolly hairs. Stem from one to two feet high, much branched, irregularly angular and striated. Branches corymbose. Leaves alternate, sessile, flat, doubly pinnate, carinate beneath. Leaflets linear, acute, entire or trifid. Flowers erect on a naked peduncle. Involucre hemispherical, imbricated, hairy, rough. The scales linear, pale-green, scarious on the margin. Florets of the disk bright yellow, numerous; those of the rays ligulate, white. Receptacle conical, covered with short, bristly chaff. Central florets tubular, glandular, five-toothed, with five stamina. Ovary obovate, with a filiform, bifid style. Stigmas two, reflexed. Seeds brown, obovate, quadrangular, ribbed.

A native of Europe, and now extensively naturalized in this country, where it has become a very troublesome weed in some places, and one very difficult to destroy, though merely an annual. It grows almost exclusively in open places, being very rarely found in woods. It flowers from June until it is killed by the frost. It has a strong and unpleasant smell, and a bitter, acrid, and nauseous taste. The whole plant is officinal. I am not aware that any analysis has been made of it; but it is probable, from its affinity to Chamomile in botanical characters and sensible qualities, that its constituents are much the same. It is not eaten by cattle, and is said to be unpleasant to bees.

Medical Properties.—It is tonic, diaphoretic, and emetic, and in fact closely resembles Chamomile in its action on the system, and is constantly used as a substitute for it in domestic practice, but is much more nauseous and unpleasant, although its remedial powers are fully equal, if not more energetic, than that article. Both Barton and Rafinesque state that it differs from the European plant in not being capable of producing vesication when fresh; this, however, seems to be erroneous, as Dr. Ashley (*Jour. Phil. Coll. Pharm.*)

speaks of it as a powerful and prompt vesicant, and one that may be very advantageously employed. The plan which he found best to insure this effect was to bruise the plant, and apply it in the form of a poultice; he observes, in addition, that unlike the blisters caused by other vegetable irritants, the vesications readily heal.

ANTHEMIS.—*Linn.*

Heads many-flowered; the rays pistillate. Scales of the involucrum imbricated in a few series. Receptacle convex or conical, with membranous chaff among the flowers. Achenia terete, or very obtusely quadrangular, striate, smooth, destitute of pappus, or with a minute crown.

A genus of odorous herbs, mostly natives of Europe and Asia, with pinnate or bipinnate leaves, and a single ebracteate head of flowers, on the ends of the branches, with their disk yellow, and the rays, in most cases, white.

A. NOBILIS, *Linn.*—Stem decumbent, simple, downy, villose. Leaves sessile, pinnately-parted, downy, leaflets divided into linear-setaceous lobes. Branches naked, one-flowered at apex. Scales of the involucre obtuse, hyaline at margin. Paleæ of receptacle lanceolate, not pointed, rather shorter than the florets, eroded at the margin.

Linn., *Sp. Pl.* 1260; Woodville, i. 47; Stokes, *Med. Bot.* iv. 242; Stephenson and Churchill, i. 38; Lindley, *Fl. Med.* 458.

Common Names.—Chamomile; Common feverfew.

Foreign Names.—Camomile Romaine, *Fr.;* Camomilla Romana, *It.;* Roemische kamiler, *Ger.*

Description.—Roots perennial, jointed, fibrous. Stems trailing, round, furrowed, downy. The leaves are pinnately-divided, and of a pale-green colour. The segments are small, rather flat above, somewhat downy, and generally divided into three or more linear, setaceous lobes. The flowers are terminal, solitary, with a convex, yellow disk, and numerous white, spreading, reflexed rays. The involucrum is hemispherical, and composed of many closely-imbricated scales, with thin, membranous edges; the disk florets are numerous, yellow, perfect, tubular, divided into five lobes; those of the ray are usually about eighteen, white, ligulate, spreading, three-toothed. The stamens are five, very short. The ovary is obovate, and supports a slender style, with a bifid, reflexed stigma. The seeds are ovate, compressed, and slightly crowned. The receptacle is conical, with minute chaffy scales, one to each floret.

Fig. 184.

A. nobilis.
a. Ray florets. *b*. Disk do.

Chamomile is a native of many parts of Europe, and is also extensively cultivated there; Mr. Nuttall states that it is naturalized near Lewistown, in the State of Delaware, but it has been detected in no other place in this country. There are several varieties, depending on

the single or double character of the flowers, which are the officinal portion of the plant. These are collected before they are fully blown, and dried. They have a bitter, aromatic taste, and strong and peculiar odour; as these properties reside principally in the tubular florets, which are most numerous in the single florets, they should always be preferred; but the large double flowers are generally the most esteemed, though inferior to the others, from their disk florets being converted into ligulate rays. By distillation, chamomile yields a Volatile oil, which, when first obtained, is of a pale blue colour, but by keeping, changes to yellow or brownish. Besides this oil, the flowers contain a bitter extractive and tannin.

Medical Properties.—Chamomile flowers are an aromatic bitter tonic in small doses, but act as an emetic when given in large ones. In the form of cold infusion they are useful in imparting tone to the digestive organs, and are frequently administered when the stomach is disordered and a sluggish condition of bowels exists. Chamomile has also been recommended in intermittent fevers and has been spoken highly of, but is inferior to many other of the tonic remedies; when given in doses sufficient to check the paroxysms, it is very liable to induce profuse discharges from the bowels. The warm infusion is often employed to aid the operation of emetics, and the oil is given to relieve flatulency. The infusion or decoction are also occasionally used in a hot state as fomentations. The general mode of administration is in infusion, made with half an ounce of the flowers to a pint of boiling water, to be macerated for ten minutes and then strained. The powder is seldom used, as it is apt to create nausea.

Several other plants have received the name of chamomile and have been used as a substitute for it; among which the most common are the *Matricaria chamomilla* and the *Pyrethrum parthenium;* both of these are bitter and tonic, but are more disagreeable than the genuine article. Another very common substitute is the *Achillea millefolium*, which is fully as efficient, and at one time enjoyed a high reputation not only as a tonic, but also as an excellent vulnerary, and is still much employed in domestic practice in many parts of Europe; its extremely disagreeable taste will, however, always prevent its coming into general use.

Anacyclus.—*De Candolle.*

Head many-flowered, heterogamous. Florets of ray, pistillate, sterile, somewhat ligulate, rarely tubular. Of the disk, perfect, 5-toothed. Receptacle conical or convex, paleaceous. Involucre in few rows, somewhat campanulate, shorter than the disk. All the florets with an ob-compressed, two-winged tube. Style of the disk florets with ex-appendiculate branches. Achenia flat, or compressed with broad, entire wings. Pappus short, irregular, somewhat toothed.

A small genus separated from Anthemis, to which, however, it is closely allied, and might without much extension of the generic characters, be considered as a section.

A. pyrethrum, *De Candolle.*—Stem procumbent, pubescent. Radical leaves petiolated, smoothish, pinnately divided. Segments much cleft into linear, subulate lobes. Cauline leaves sessile. Branches one-flowered. Scales of involucre lanceolate, acuminate, with a brown margin.

Linn., (*Anthemis,*) *Sp. Pl.* 1262; Stephenson and Churchill, ii. 97; *Anacyclus pyrethrum*, De Candolle, *Prod.*, vi. 15.

Common Names.—Pellitory of Spain; Spanish Chamomile.
Foreign Names.—Pyrethre, *Fr.;* Piretro, *It.;* Zahn Wurtzel, *Ger.*

Description.—Root fusiform, fleshy. Stems several, about a foot high, round and hairy, one-flowered. The leaves are pinnately divided, with narrow, linear segments of a pale green colour. The flowers are large, terminal, solitary, with the florets of the disk yellow, and those of the radius white above and purplish beneath; these latter are pistillate and sterile. The disk florets are perfect, and closely resemble those in *Anthemis*.

Pellitory is a native of the Levant, Arabia, Barbary, and the South of Europe, and has long been known as a medicinal agent. Dioscorides mentions it as useful in toothache, and Celsus speaks of it as one of the articles forming a celebrated *malagma* or cataplasm, employed as a resolvent; he also states that it is useful as opening the mouths of wounds. The part used is the root, which as found in commerce, consists of inodorous pieces, about the size of the little finger, covered with a thick brown bark, marked with black shining points; it breaks with a resinous fracture, and presents a radiated structure. When chewed, it excites a pricking sensation in the lips and tongue, with a burning heat. Grew gives a curious account of its effects; he says, "The heat produced by Pyrethrum is joined with a kind of vibration, as when a flame is brandished with a lamp furnace. Being chewed, it makes a sensible impression on the lips, which continues, like the flame of a coal, betwixt in and out, for nine or ten minutes, but the heat in other parts much longer." By distillation this root furnishes a thick, resinous oil, of great pungency, and it is on this oil the properties of the root depend; it has been considered as peculiar, and called *pyrethrin*; besides this it contains colouring matter, tannin, &c.

Medical Properties.—It is an energetic local irritant, producing inflammation and vesication. It is scarcely ever employed internally, but is sometimes used as a masticatory in toothache, and in some paralytic affections of the tongue, and rheumatic and neuralgic attacks in the head and face. In India, according to Ainslie, it is given by the Vytians as a cordial and stimulant in lethargic cases, in palsy, and in certain stages of typhus. It is one of those articles that might be advantageously omitted in the list of officinal drugs. The tincture is used to relieve toothache, under the name of odontalgic tincture.

Achillea.—*Necker.*

Heads many-flowered; rays few, or 10—20, pistillate, short. Scales of involucre imbricated. Receptacle flat, sometimes elongated, chaffy. Achenia oblong, ob-compressed, margined, destitute of pappus.

An extensive genus of herbaceous perennials, with alternate, mostly pinnatifid or pinnately divided leaves, and small, corymbose heads. They are principally natives of Europe, a few only occurring in other parts of the world. The genus was formerly much larger than at present, but the separation of *Ptarmica* from it, has greatly reduced it. All the species are bitter and somewhat aromatic.

A. millefolium, *Linn.*—Cauline leaves nearly sessile, bipinnately divided. Lobes linear, 3—5-cleft, mucronate. Radical leaves petiolate. Corymb compound, fastigiate. Rays 4—5.

Linn., *Sp. Pl.* 899; Torrey and Gray, *Fl.* ii. 409; Bulliard, *Herb.* t. 163; *Eng. Bot.* 758.

Common Names.—Yarrow; Milfoil.

Foreign Names.—Millefeuille, *Fr.*; Millefoglie, *It.*; Garbenkraut, *Ger.*

This plant is common to Europe and North America, growing in fields and woods, and flowering almost the whole summer. The American plant is pos-

sessed of more active qualities than the European. It is bitter and tonic, with a strong aromatic, but unpleasant smell; the root is somewhat astringent. On distillation, it affords an essential oil, somewhat similar to that of chamomile.

Medical Uses, &c.—This plant had at one time much reputation, from the supposed efficacy of its leaves in the cure of recent wounds; but they are now seldom used for this purpose. Ferrein speaks of them as beneficial in intermittent fevers, hæmorrhages, and abortion. Hoffmann considered the flowers as antispasmodic; and Maumery (*Journ. de Med.* xxxiv. 402), speaks of them highly in retention of the menses and flatulent colic. They have also been recommended in leucorrhœa and nervous atony. Linnæus (*Flor. Lapp.*) states that in Dalecarlia they are added to beer to increase its strength. The root, when fresh, has a slight camphoraceous smell, and has been proposed as a substitute for Serpentaria; but trials made with it have proved that it is very inefficient.

Several other species are also employed, as the *A. nobilis* in the South of Europe; and *A. falcata* in Asia Minor and Egypt, where it is highly esteemed in hypochondriasis. The *A. ageratum* has some reputation in the South of Europe as a vermifuge.

PTARMICA.—*Tournefort.*

Involucre campanulate, scales brown and scarious at their edges. Receptacle flat, chaffy. Rays flat, longer than the involucre. Achenia ob-compressed, often with a wing-like margin.

This genus was originally instituted by Tournefort, but the species were all included in *Achillea* by Linnæus. De Candolle has followed the first of these writers, and observes that it is intermediate between *Anacyclus* and *Achillea*, and is different in habit from either. Torrey and Gray have considered it as a section of the latter genus. It is almost wholly European, a few species only being found in North America and Siberia.

P. VULGARIS, *De Candolle.*—Leaves glabrous, lanceolate-linear, sharply and equally serrate, with appressed teeth. Heads loosely corymbose. Rays 8—12, much longer than disk.

De Candolle, *Prod.* vi. 23; Torrey and Gray, *Fl.* ii. 409; *Achillea ptarmica, Sp. Pl.* 1266; *Eng. Bot.* 757.

Common Names.—Sneeze-wort; Goose-tongue.

Foreign Names.—Herbe à eternuer, *Fr.;* Herba starnuta, *It.;* Niesekraut, *Ger.*

A native of many parts of Europe; and, according to Pursh, also found in this country, but has not been met with by any other botanist. It flowers in the autumn. It is slightly odorous, and its leaves have a taste resembling that of Tarragon; when chewed, they occasion a flow of saliva, and the dried herb in the form of powder produces sneezing.

Medical Uses, &c.—The root is employed for a masticatory as a substitute for Pellitory, and is applicable to the same description of cases. The powdered herb is used as a sternutatory, which property it enjoys, according to Sir J. E. Smith, (*Eng. Bot.*,) on account of the minute prickles that border the leaves. A decoction of the whole plant has some reputation in Russia in hematuria and hæmorrhagia.

Many of the other species have been employed in medicine; thus, the *P. nana, moschata*, and *atrata*, which are remarkable for their strong musky odour, constitute a portion of the plants known in Switzerland under the name

of *Genipi*, and which are much esteemed for their vulnerary and sudorific properties. A liqueur is prepared from them called *Absinthe de Suisse*, which is in high repute as a stomachic and tonic. The *A. moschata* also furnishes a distilled water much used in Europe, and known as *Esprit d'Iva*. The *P. herba rota*, of Piedmont, according to Allioni, (*Flor. Ped.* 656,) possesses the same properties, and is much used. The *P. clavennæ* was at one time greatly prized, in consequence of a treatise published on its virtues by Clavenna, in 1609; but it does not appear to possess more efficacy than the other species spoken of above.

Artemisia.—*Linn.*

Heads discoid, few or many-flowered, heterogamous, with the central flowers perfect, and five-toothed; and the radical pistillate in a single series, with a tubular, 3-toothed corolla; or sometimes homogamous, with the flowers all perfect. Scales of the involucre imbricated, mostly dry, with scarious margins. Receptacle flattish or convex, naked or villous. Achenia obovoid, with a small epigynous disk, and destitute of a pappus.

An extensive genus of bitter and mostly aromatic shrubs or herbs, with alternate, and usually pinnately divided or dissected leaves, and small spicate or racemose heads of flowers, which are usually yellowish or purplish. A large number of them are natives of North America. The genus presents several well-defined sections, which have been erected into genera by some botanists.

A. absinthium, *Linn.*—Suffruticose, erect, silky canescent; leaves bi- or tripinnately divided; the lobes lanceolate, often incised, obtuse; flower-heads small, hemispherical, racemose paniculate, nodding; external scales of involucre, linear or lanceolate, silky; the inner broad, rounded and scarious.

Linn., *Sp. Pl.* 1188; Torrey and Gray, *Fl.* ii. 424; Woodville, i. t. 22; Stephenson and Churchill, i. 58; Lindley, *Fl. Med.* 464.

Common Name.—Wormwood.

Foreign Names.—Absinthe, *Fr.;* Assenzio, *It.;* Wermuth, *Ger.*

Wormwood is a native of Europe, and is naturalized in the Northern parts of this country; it is also cultivated in most gardens. It flowers in July and August. The whole plant has a strong fragrant odour, and an intensely bitter aromatic taste. The tops, or extremities of the branches are the officinal part; they have a grayish-white appearance, and a soft, silky feel, and give out their properties to water and alcohol. These depend on a bitter principle *Absinthin*, and a volatile oil, which is of a yellow or brownish colour, and very bitter and acrid; besides this, Wormwood contains an acid, which is called the *Absinthic*, several salts, &c.

Medical Properties.—In moderate doses Wormwood has the properties of the other aromatic, bitter tonics, but is inferior to many of them. It is also anthelmintic, and somewhat diuretic. In large doses it acts as an irritant and stimulant, and also appears to affect the cerebro-spinal system, as it causes vertigo, headache, &c. It is but little employed in medicine at the present day, but was in much repute formerly. Haller speaks of it highly as a stomachic, and as a preventive to attacks of the gout; and it formed one of the ingredients of the celebrated Portland powder so highly vaunted as a cure for that disease. The essential oil is recommended by Hoffmann as an antispasmodic and anodyne, and by Boerhaave in intermittents. It is chiefly used, at present, in dyspepsia, and is much employed in France and Germany as a bitter. The dose, in substance, is a scruple to half a drachm; of the infusion, made with an ounce of the herb to a pint of water, an ounce to two ounces.

2. A. ABROTANUM, *Linn.*—Shrubby, erect; upper leaves setaceous, pinnatifid; lower ones bipinnately divided; stem much branched.

Linn., *Sp. Pl.* 1185; Blackwell, *Herb.* 555; Stephenson and Churchill, i. 58; De Candolle, *Prod.* vi. 108.

Common Name.—Southern Wood.

Foreign Names.—Citronelle, *Fr.;* Abrotano, *It.;* Stabwurze, *Ger.*

A perennial shrub, native of the southern parts of Europe, Syria, and China; it is cultivated in most gardens on account of its odour, which is grateful to most persons. Its medical properties are the same as those of Wormwood, but its taste is more nauseous. It is now seldom used, but in the days of old Gerarde, it was highly extolled in a variety of diseases, and was considered as a potent alexipharmic.

3. A. SANTONICA, *Linn.*—Stem leaves pinnate, linear, multifid, smooth. Branches undivided. Flowers secund, reflexed. Heads with five florets.

Linn., *Sp. Pl.* 1187; Woodville, t. 123; Stephenson and Churchill, i. 58.

Common Names.—Tartarian Southern wood; Worm seed.

Foreign Names.—Sementine, *Fr.;* Santonico, *It.*

This species is a native of Tartary and Persia. It much resembles the common wormwood in its properties. The seeds, with those of the *A. Judiaca*, were at one time much employed under the name of *Semen contra*, as an anthelmintic, but are superseded by articles of more efficiency.

A number of other species have, at different times, been employed as remedial agents, among which may be noticed the *A. vulgaris*, or Mugwort, which is much used in some parts of Europe as an emmenagogue and antihysteric, and has been highly spoken of by some practitioners in Germany, in the treatment of epilepsy; it also enjoys much reputation in China, where it is called *Y-trao*, or the Doctor's plant. It is one of the species employed in the preparation of Moxa, which, however, Dr. Lindley is of opinion, is prepared only from the *A. moxa*, and *A. chinensis*, but most other writers state that it is made from several of the species. Another of these plants, the *A. dracunculus*, or Tarragon, is cultivated in gardens, and used as a condiment, and for flavouring vinegar, mustard, &c. From *A. mutellina*, and *A. spicata*, the bitter aromatic liqueur, called *Creme d'absinthe*, is principally made. The leaves of *A. maderaspatana* are esteemed, in India, a valuable stomachic medicine, and are also used in anodyne and antiseptic fomentations (*Ainslie*, i. 481). *A. indica*, is considered to possess deobstruent and antispasmodic virtues, and is prescribed in infusion and electuary, in cases of obstructed menses and hysteria (*ibid.* ii. 195). The flower-heads of several constitute the vermifuge called *Semen contra;* these are *A. sieberi*, *lercheana*, *contra*, and *pauciflora*.

TANACETUM.—*Linn.*

Heads discoid, homogamous, with the flowers all tubular and perfect, or heterogamous; the radical flowers pistillate, in a single series, 3—4-toothed. Scales of the involucre dry, imbricated. Receptacle naked, convex. Achenia angled, or ribbed, glabrous, with a large epigynous disk. Pappus wanting, or minute, membranous, entire, or toothed, often unequal.

A small genus of suffruticose or herbaceous plants, with alternate, variously divided leaves, and solitary or corymbose heads of yellow flowers. They are generally natives of temperate and cold regions.

T. VULGARE, *Linn.*—Stem herbaceous, erect, smooth. Leaves smoothish, bipinnately parted, the rachis and lobes incisely serrate. Flowers in a many-headed corymb; inner scales of the involucre scarious at the apex, obtuse; pappus short, equal, five-lobed.

Linn., *Sp. Pl.* 1184; Torrey and Gray, *Fl.* ii. 414; Woodville, t. 115; Stephenson and Churchill, ii. 96.

Common Name.—Tansy.

Foreign Names.—Tanaisie, *Fr.;* Tanaceto, *It.;* Rheinfarn, *Ger.*

Tansy is a native of Europe, but is naturalized in many parts of the United States, and is cultivated in gardens in both countries, as is also a variety with curled leaves, known under the name of Curled tansy. The leaves and flowers are used; they have a disagreeable, peculiar, and strong odour, and a warm, bitter taste. These qualities they impart to water and alcohol, and on distillation, afford a yellowish-green essential oil, having the peculiar smell of the plant; besides, they contain a peculiar acid, which has been called the *tanacetic*, bitter resin, fatty oil, wax, &c. The medical properties are owing to the oil and bitter resin.

Medical Properties.—Tansy is tonic, stomachic, and anthelmintic, but is rarely employed by the physician, but is in high repute in domestic practice. It was found useful in dyspepsia, hysteria, and intermittent fever, and like all the other stimulating herbs, in obstructed menstruation. There is a common belief that it acts specially on the uterus, and hence the oil has frequently been resorted to, for the production of abortion, and several cases of death have ensued from the practice. As a vermifuge, it certainly possesses some power, but is far inferior to several other articles, and therefore is seldom used in this country.

Antennaria.—*Gærtner.*

Heads many-flowered, diœcious; all the flowers tubular; in the pistillate flowers filiform. Scales of involucre imbricated, appressed, scarious, coloured. Receptacle convex or nearly flat, naked. Style 2-cleft in the fertile flowers. Achenia somewhat terete. Pappus a single series of setiform or capillary scabrous bristles in the pistillate flowers; clavate in the staminate.

A small genus of herbaceous, rarely suffruticose plants, with sessile or decurrent leaves; mostly woolly or tomentose. The species occur in many parts of the world; eight are natives of the United States. Many of the species have been employed in medicine, but none of them are of sufficient importance to require a detailed account of them. Among the native kinds, the *A. margaritaceum* or Everlasting has some reputation in domestic practice as an anodyne and pectoral in diseases of the respiratory organs; it is also a mild astringent, and has proved beneficial in bowel complaints. It is used externally as a cataplasm in painful tumours, contusions and sprains, and is certainly very efficacious in relieving pain and disposing to sleep, often succeeding where the Hop poultice has proved ineffectual. The *A. plantagineum* and *dioicum* or White plantain are popularly supposed to be beneficial in snake-bites, and are among the articles said to have been used by the Indians for this purpose; they are both pectoral and somewhat demulcent. These species it should be noticed have usually been included in *Gnaphalium*, but are now considered as forming a distinct genus, which was originally constituted by Gærtner, and has been adopted by R. Brown, De Candolle, Torrey and Gray, and others.

Arnica.—*Linn.*

Heads many-flowered, radiate; radial flowers pistillate and often furnished with sterile stamens; disk flowers tubular, perfect. Scales of the involucre lanceolate, equal, somewhat in two series. Receptacle flat, fringed or hairy. Tube of the corolla hairy; limb of the disk flowers 5-toothed; style with long pubescent branches, either truncate or

tipped with a short cone. Achenia terete, tapering to the base or fusiform, somewhat ribbed, commonly hairy. Pappus a single series of rather rigid barbellate or strongly scabrous capillary bristles.

Mostly perennial herbs indigenous to the colder regions of the northern hemisphere, with simple stems, having solitary or somewhat corymbose, large heads of yellow flowers. The leaves are undivided and opposite.

A. MONTANA, *Linn.*—Radical leaves obovate, entire; the cauline ones in one or two pairs. Stem one to three-headed. Involucre rough, glandular.

Linn., *Sp. Pl.* 1245; Woodville, 1, t. 17; Stephenson and Churchill, ii. 123; Lindley, *Fl. Med.* 465.

Common Name.—Leopard bane.

Foreign Names.—Arnique, Tabac des Vosges, *Fr.;* Arnica, *It.;* Wolferley, *Ger.*

Description.—Root blackish, woody, abrupt at the lower end, furnished with many long, slender fibres. The stem, which rises about a foot in height, is simple, obscurely angled, striated, rough, hairy, and terminated by one to three upright peduncles, each bearing one flower of a deep yellow colour, somewhat tinged with brown. The radical leaves are ovate, entire, ciliated, and obtuse; the cauline ones are in opposite pairs, and lanceolate. The involucre is cylindrical, and composed of fifteen or sixteen rough, hairy, lanceolate scales, of a dingy green colour, but purple at the points. The disk florets are very numerous, tubular, with a five-lobed limb; those of the radius about fourteen, ligulate, striated, three-toothed, and hairy at the base. The achenia are oblong, blackish, hairy, and crowned with a straw-coloured capillary pappus.

The Arnica is a native of the more northern parts of Europe and Asia, in moist shady situations, and flowering in June and July. It does not appear that it was known to the ancients, though Matthiolus was of opinion that it was mentioned by Dioscorides, but as it is a native of no part of Greece or the adjoining countries, it is probable that he is in error. Tabernæmontanus is the first who noticed it, some time in the sixteenth century. All parts of the plant are used, but the flowers are preferred; these, when dried, are yellowish, and have an aromatic but unpleasant odour, and an acrid nauseous taste. The root is blackish, and possesses the same sensible properties as the flowers. The leaves have an aromatic smell and excite sneezing. The flowers have been analyzed by Chevalier and Lassaigne with the following results: Resin having the odour of the flowers, a Bitter acrid matter resembling cytisine, Gallic acid, a Yellow colouring matter, Gum, Albumen, and some salts. Dr. A. T. Thomson (*Lond. Dispen.*) is of opinion that the plant also contains an igasaurate of strychnia or brucia.

Medical Properties.—In large doses Arnica exerts a powerful influence on the system. It causes great anxiety, especially in the stomach, with burning in the throat, nausea, and sometimes vomiting. If it reach the intestines it induces colicky pains, rarely followed by alvine evacuations. If the dose be still larger, it operates on the nervous system, causing headache, vertigo, and twitchings of the extremities. This remedy is much used in Germany in a variety of diseases, and the evidence in favour of its curative powers is very great. Stoll employed it with much success in dysentery and considered it as a specific in certain cases, as where the disease was epidemic, and had assumed a typhoid form (*Med. Prac.*) The fullest trial was made of it by Dr. Collin of Vienna; he states that he cured 36 quotidian, 46 tertian, and 58 quartan intermittents with the extract of Arnica, a drachm being given during the day. This febrifuge power of the article is confirmed by the testimony of Dr. Sebold of Prague.

It is also given in palsy, tremors, and amaurosis, but the evidence as to its

curative powers in these diseases is very contradictory, though it is evident, from all the accounts, that it possesses some influence over the nervous system, and may be advantageously employed in certain cases. In Russia it is a popular remedy in nyctalopia, and is said to cure it in a few days. (*Jour. Litt. étrang.*) There is also a popular belief in the North of Europe that it is very beneficial in wounds and contusions of the head, and the disordered condition of the system consequent on these accidents, and hence it has been termed *Panacea lapsorum*. To conclude, the German practitioners are enthusiastic in favour of the virtues of the Arnica in almost every disease where there is debility, torpor, or inactivity of function, and although it is by no means as powerful an agent as they represent it, it is one that deserves more notice than it has received in this country, where it is seldom prescribed or even known.

It is given in powder, in doses of five to ten grains, but more generally in infusion, made with half an ounce to a pint of water, of which half an ounce to an ounce may be administered at a time. The extract is also a good form of exhibition, to be given in divided doses to about the extent of a drachm a day. (See Dunglison, *Thérap.* i. 387.)

Pommier says that the flowers are apt to become black in the process of drying, when they exhale an ammoniacal smell, and afterwards that of Tobacco, and that they, as well as the leaves, are used by the peasants of the Pyrenees as a substitute for that article, whence the name of *Tabac des Vosges*. A full account of this remedy has been given by Dr. Wood. (*Am. Med. Cyclop.* ii. 261.)

The *A. scorpioides* (*Aronicum*) was known to the ancients, and is supposed by Merat and De Lens to be the plant designated by Pliny under the name of *Cammaron*, but Linnæus thought that this epithet applied to an *Aconitum*, which he called *Cammarum*. Some of the North American species approach very closely to the *A. montana* in their characters, as the *A. angustifolia* and *C. hamissionis*, both of which were considered by Hooker (*Fl. Am. Bor.* i. 330) to be varieties of it. It is probable that they as well as the *A. nudicaule* may be used as substitutes for the European plant.

Tribe 4. CYNAREÆ.—Style of the perfect flowers nodose, thickened, and often penicillate at the summit; the stigmatic lines not prominent, reaching to and confluent at the summit of the externally puberulent branches.

CNICUS.—*Vaillant.*

Heads many-flowered; the ray-flowers sterile, slender, nearly equal to the disk. Scales of the ovoid involucre coriaceous, appressed, produced into a long and rigid pinnated spinose appendage. Receptacle densely clothed with capillary bristles. Achenia terete, smooth, strongly striate, with a large lateral basilar areola. Pappus triple, the outer being the horny crenated margin of the fruit; the middle one of 10 long stiff hairs; the inner of the same number of short bristles.

This genus contains but a single species, which has been successively considered as a *Carduus* and *Centaurea*. It is an annual, somewhat woody, branching herb, with amplexicaul and somewhat decurrent undivided, subpinnatifid leaves, and yellow flowers in bracteate heads.

C. BENEDICTUS, *Linn.*—The only species.

Linn. (*Centaurea*), *Sp. Pl.* 1296; Woodville, i. t. 14; Stephenson and Churchill, iii. 128.

Common Name.—Blessed Thistle.

Foreign Names. — Chardon benit, *Fr.;* Carda santa, *It.;* Benedicten-flockenblume, *Ger.*

Description.—Root tapering, whitish, branched, fibrous. Stems several, a foot and a half high, trailing, roundish, furrowed, reddish, woolly. The lower leaves are petiolate, but the upper are sessile, alternate, and somewhat decurrent; the whole are oblong, rough, aculeate, sinuate or almost ruminate, and armed with many sharp spines; of a green colour above, and paler and reticulated beneath. The flowers are large, of a bright yellow colour, solitary at the ends of the branches, enclosed by a bracteate involucrum of ten leaves, the five exterior of which are largest. True involucrum ovoid, imbricated, smooth, woolly, each scale being terminated by pinnate spines, connected with the bracts by fine threads. Ray-florets small and sterile, those of the disk perfect, tubular and toothed. Stamens five, downy, with linear-oblong united anthers. The style is filiform with a cleft stigma. The achenia are oblong, brown, striated, on a bristly receptacle.

It is difficult to ascertain where this plant is truly indigenous, but it is found in the South of Europe, Barbary, the Levant, Persia, China, and sparingly in this country, especially in Mexico. It is often cultivated in gardens as an ornamental flower. It flowers in June and July. The part used is the leaves; these when dried have a slight, but disagreeable smell, and an intensely bitter taste, which is given out to water and alcohol. They contain, according to Morin (*Jour. Chim. Med.*), Volatile oil, a Bitter principle, Resin, a Fixed oil, Gum, Sugar, Albumen, some salts, &c. The bitter principle, which is called *Cnicin*, is probably the efficient constituent.

Medical Properties.—The Cnicus is tonic, diaphoretic, or emetic, according to the mode of administration: the cold infusion acting as a mild tonic; when administered warm it induces copious perspiration; and made very strong or in decoction provokes nausea and vomiting. It was formerly in such high repute that it received the name of "*blessed*," and was considered as effectual in plague and other malignant disorders, and Simon Pauli eulogizes it as a certain cure for cancers. It is now but seldom used, but might be advantageously employed. The infusion is made with half an ounce of the leaves to the pint of water, and the dose is from an ounce to two ounces as a tonic.

Carthamus.—*Tournefort.*

Involucrum dilated at base, scales imbricated, closely applied to each other below, but separated and foliaceous above. Receptacle silky, achenia destitute of a pappus.

A small genus of herbaceous plants, principally natives of Asia, with alternate sessile leaves which are somewhat spinous. The flowers are yellow.

C. tinctorius, *Linn.*—Leaves ovate-lanceolate, serrate-spinose; branches smooth; fruit subtetragonal.

Linn., *Sp. Pl.* 1162; Willdenow, iii. 1706; *Flore Medicale*, ii. 101; Lamarck, *Illus.* t. 661, p. 3.

Common Names.—Safflower; Bastard Saffron.

Foreign Names.—Carthame, Faux Saffron, *Fr.;* Cartamo, *It.*

The Safflower is a native of the Levant and Egypt, and is cultivated in many parts of Europe, and this country. The only part which is officinal, is the florets. As found in commerce they are in flaky masses, of a red colour, intermixed with yellow filaments, the former tint being due to the corollas, and the latter to the stamens. The smell is aromatic but peculiar, and the taste somewhat bitter. They contain two peculiar colouring matters,

one yellow, soluble in water, and the other red, *Carthamite* or *Carthamic acid*, soluble in alkaline solutions. It is this latter that renders the Safflower valuable as a dye, especially of silk, for which, and other tinctorial purposes, it is much used; and from this principle is also prepared one of the kinds of *rouge*.

Fig. 185.

C. tinctorius.

Medical Properties.—In large doses, Safflower acts on the bowels, and according to Barham (*Hort. Jam.*), is used in Jamaica as a remedy in jaundice. In warm infusion it possesses some sudorific properties, and has been recommended instead of Saffron, to promote the eruption in exanthematous diseases.

The seeds, which are white, angular, and irregular at their base, have been much more employed in medicine than the flowers. They afford an oil by expression, which is mentioned as purgative by Hippocrates (Sprengel, *Hist. Med.*), and is still used for that purpose in India, as well as for an external application in rheumatic pains and paralytic affections, and also for bad ulcers. (Ainslie, *Mat. Ind.*) Loureiro states that in Cochin China the seeds are considered as purgative and emmenagogue; they were likewise employed in Europe in the form of emulsion, and entered into the composition of a purgative preparation called *Diacarthami*, but are now completely gone out of use.

Lappa.—*Tournefort.*

Heads many-flowered; flowers all perfect. Involucre globose; the imbricated scales coriaceous and appressed at the base, and subulate and spreading above, with their rigid apex uncinate. Receptacle flat, somewhat fleshy, setose fimbriate. Corolla 5-cleft, 10-nerved. Anthers tipped with filiform appendages, caudate at base; filaments papillose. Branches of the style free and divergent at apex. Achenia oblong, compressed, glabrous, transversely rugose. Pappus of numerous, short, filiform, scabrous bristles, not united in a ring, caducous.

A genus of biennial much-branched herbs; with large cordate and petiolated leaves, with slightly undulated margins, and their lower surface more or less tomentose. Heads small, solitary, or somewhat corymbose. Corolla purple, varying to white.

L. major, *Gærtner.*—Scales of the involucre all subulate, and with uncinate tips, either glabrous or loosely arachnoid; the upper cauline leaves ovate, the others large, cordate.

Linn., (Arctium) *Sp. Pl.* 1143; Gærtner, *Fruc.* ii. 379; Torrey and Gray, *Fl.* ii. 462; Woodville, i. 32.

Common Names.—Burdock; Clot Burr; Bat Weed, &c.

Foreign Names.—Bardane, Glouteron, *Fr.*; Bardana, *It.*; Gemeine Klette, *Ger.*

Description.—Root tapering, fleshy, biennial, of a brown colour externally. The stem is erect, three or four feet high, succulent, pubescent, branching, furnished with large, cordate, denticulate leaves, of a dark-green colour above, and whitish and tomentose beneath. The flowers are purple, in panicled heads. The involucre consists of imbricated scales, with a horny, hooked extremity, by which they can attach themselves to objects. The florets are all perfect, 5-cleft, with a 10-nerved tube. The stamens have papillose filaments, and their anthers are terminated by filiform appendages, and have subulate tails at base. The stigmas are free at the apex, diverging and curved outwards. The receptacle is somewhat fleshy, flat, and furnished with stiff subulate fringes. The achenia are oblong, smooth, with a rough, prickly pappus.

The Burdock is a native of Europe, but is extensively naturalized in this country, and is found on road-sides, along fence-rows, and in waste places, in rich soil. Three species are recognised by some writers in the *Arctium lappa*, of Linnæus, namely, the *L. major*, *L. minor*, and *L. bardana*, but they are at most but varieties. The officinal parts are the root and seeds. The first loses about four-fifths of its weight by desiccation. Its odour is weak but unpleasant, and its taste mucilaginous and sweetish, with a little bitterness and astringency. The seeds are aromatic, bitterish, and somewhat acrid. The roots have been analyzed and found to contain a Gummy extractive, Sugar, a large quantity of Inuline, some salts, &c. According to Lemery, this plant was known to Dioscorides, and the other ancient writers on the Materia Medica.

Medical Properties.—The root is diaphoretic and diuretic, and was at one time much used in syphilis, rheumatism, and gout, but its great employment was as a depurative, and there is strong evidence that it has proved highly beneficial, though Cullen was of a contrary opinion. In diseases of the skin Alibert states that it seldom fails in doing good where there is aridity of the surface; like Sarsaparilla, its use must be persevered in for a long time. It has also been employed, according to Gmelin (*Flor. Siber.*), in hysteria.

The seeds are said to be more diuretic than the root, and according to Linnæus, they also act as purgatives. The leaves have been used as an external application to ulcers, and are stated to have proved very beneficial in *tinea*, especially when a decoction of the root is at the same time administered internally. The juice of the leaves mixed with oil, so as to form a soft ointment, was a favourite application of Baron Percy's, to obstinate ulcers.

The decoction of the root is made by boiling two ounces of the recent root with three pints of water down to two pints, of which one half is to be administered daily. The dose of the seeds is about a drachm.

Sub-order 2. Liguliflorae.—Flowers all ligulate and perfect, disposed in a homogamous radiated head. Pollen scabrous and many-sided, usually dodecahedral.

Tribe 5. Cichoradeæ.—Style cylindraceous above, the summit as well as the rather obtuse branches, uniformly pubescent; stigmatic lines terminating below or near the middle of the branches. Plants with a milky juice. Leaves alternate.

Hieracium.—*Tournefort.*

Heads many-flowered. Scales of involucre imbricated or only in two series; the outer short and somewhat calyculate. Receptacle scrobiculate or somewhat areolar, fimbriate. Achenia oblong or columnar, often subclavate, rarely fusiform, striate or ribbed, not rostrate. Pappus of a single series of persistent, delicate, rough bristles, of a brownish-white or fuscous colour.

An extensive genus of perennial herbs mostly peculiar to the northern hemisphere, with entire or dentate leaves, which are generally bristly and pubescent; the soft pubescence often stellate, the more rigid hairs glandular or toothed. Flowers in most cases yellow, rarely white or orange.

H. venosum, *Linn.*—Stem naked or with one leaf, slender, smooth, branched above, so as to form a compound corymb; radical leaves obovate or spathulate oblong, entire or slightly dentate, glaucous beneath with purple veins, margins and midrib villous.

Linn., *Sp. Pl.* 1125; Torrey and Gray, *Fl.* ii. 477; Elliott, *Sk.* ii. 262.
Common Names.—Rattlesnake weed; Hawk weed; Blood wort.

Description.—Root perennial, stem or scape one to two feet high, sometimes naked, sometimes with one or more cauline leaves, glabrous, slender, several times dichotomous,

so as to form a compound diffuse corymb, with a subulate bract at each division. The radical leaves are obovate or oblong spathulate, entire or slightly-toothed, with a short petiole, thin, often glaucous and purplish beneath, the margins and midrib villous, but the surfaces often glabrous, the first that unfold are appressed to the ground; the cauline leaves when present glabrous. Heads small and about 20-flowered, base of involucre and peduncles usually somewhat hispid with short hairs; inner scales of involucre glabrous or nearly so. Florets bright and yellow. Achenia linear.

The Hawkweed is a native of many parts of the United States, but is most common to the northward and eastward. It flowers from May to July. The parts that have been used medicinally are the leaves and root. These have no odour, but a bitterish and somewhat mucilaginous taste. No chemical examination has been made of them.

Medical Properties.—The Hawkweed is used in domestic practice as a mild astringent and expectorant in hæmoptysis and chronic catarrh, and has been given in scrofula and amenorrhea, but does not appear to be possessed of any very decided powers, and is noticed now only on account of its reputed power in curing the bites of venomous snakes. Among the Indian tribes a great number of vegetable substances were considered as antidotes against the venom of snakes; some of these, although not now employed as alexipharmics, are of indisputable remedial powers, as the Polygala, the Serpentaria, and the Cimicifuga, whilst on the other hand many of them appear to be almost devoid of any active properties, as the Prenanthes, the Alisma, the Pedicularia, and the plant now under consideration, and yet there are numerous instances on record where they apparently have effected a cure (Pursh, *Flor.* ii. 499; *Tech. Repos.* iv. 258). The Hawkweed is mentioned by Schœpf as of much efficacy, the root and leaves being applied in a bruised state to the wound, and the juice taken internally. Some years since a person of Elnsworth brought a collection of rattlesnakes to this city and professed to be in possession of a certain cure for the symptoms arising from their bite, which he offered to divulge for a moderate compensation. This being paid him, he suffered himself to be bitten several times, and after the poisonous effects had displayed themselves, was completely relieved by taking a few ounces of the decoction of the root of a plant which was identified by Dr. Pickering as the *Hieracium venosum.* The same snake was suffered to bite a small puppy, which died from the poison in about five hours. These experiments were made in the presence of a number of distinguished medical and scientific persons, so that no deception was practised. A full account of them by Dr. R. Harlan, will be found in the third volume Transactions of American Philosophical Society, New Series. Although it must be admitted that this plant certainly appeared to counteract the effects of the poison, still reliance should not be placed upon it to the exclusion of the more sure means of suction, pressure or ligature; though it well deserves a full examination both as respects its real medicinal powers and its chemical composition.

Taraxacum.—*Haller.*

Heads many-flowered. Involucre double, exterior of small scales appressed, spreading or reflexed; inner ones, erect in a single series. Receptacle naked. Achenia oblong, ribbed or angled, muricate on the ribs, the apex abruptly produced into a beak. Pappus of many white capillary bristles.

A small genus of perennial stemless plants, with simple hollow and naked one-headed scapes, and oblong, or lanceolate leaves, which are nearly entire, sinuately-toothed or runcinate. The flowers are yellow. They all abound in a milky bitter juice.

T. DENS LEONIS, *Desfontaines.*—Leaves unequally and acutely runcinate; the lobes toothed anteriorly; scales of involucre not corniculate, exterior reflexed; achenia muricate at top.

Leontodon taraxacum, Linn., *Sp. Pl.* 1122; Woodville, i. 39; Stephenson and Churchill, i. 5; *Taraxacum dens leonis*, Torrey and Gray, *Fl.* ii. 494; Haller, *Hist.* i. 23.

Common Names.—Dandelion; Puff ball, &c.

Foreign Names.—Dent de lion, *Fr.;* Tarassaco, *It.;* Lowenzahn wurzel, *Ger.*

Description.—Root fusiform, white and fleshy within, covered with a brown epidermis. Leaves radical, numerous, spreading, smooth, of a bright-green colour, deeply sinuated or runcinate. Scape erect, round, smooth, brittle, fistulous, bearing a single head of flowers of a golden yellow colour, which expand in fine weather and in the morning only, and close in the evening. The involucre is imbricated oblong, and double; the exterior scales being small, appressed, spreading and reflexed; the inner are in a single series, larger and erect. The florets are numerous, equal, ligulate, truncated, five-toothed. The stamens have capillary filaments with conjoined anthers. The ovary is obovate, crowned with a slender cylindrical style, with two revolute stigmas. The receptacle is convex, naked and punctate. The achenia are solitary, oblong, and supporting a simple radiated pappus on a long pedicel.

Fig. 186.

T. dens leonis.

The Dandelion is a native of Europe, and is naturalized in almost every part of the United States. It flowers from the commencement of the spring to late in the autumn. There are several species admitted by botanical writers, which appear to be merely varieties of this one, and which possess the same physical characters. The part used in medicine is the root; this, in the fresh state, is fusiform, somewhat branched, fleshy and abounding in a milky juice. Externally it is brownish or brownish-yellow, internally white. It is destitute of any marked odour, but has a bitter taste. On drying, it loses more than half its weight, and yields on pressure in the fresh state about the same proportion of juice. For medical purposes it should be gathered in the summer and early in the autumn. On analysis, it has been found to contain Gum, Gluten, Albumen, an Odorous principle, Extractive, Caoutchouc, a peculiar Bitter crystallizable principle, some salts, &c. It is not certain that it was known to the ancients, though as it is a native of Greece and Italy it probably was so. The Arabian physicians were acquainted with it, and it was much used in the middle ages and held in high estimation.

Medical Properties.—The Dandelion is aperient, diuretic, and resolvent, and as just stated, was at one time much used, and thought to be endowed with very powerful properties. Park, an old English writer, says "Whoso is macilent, drawing towards a consumption, or ready to fall into a cachexy, by the use hereof for some time together, shall find a wonderful help." Almost all

the old authors speak of it in equally favourable terms. Boerhaave had a high opinion of its powers, and esteemed it capable "if duly continued, of resolving obstinate obstructions and coagulations of the viscera." But like many other remedies, it appeared to be wholly forgotten for a long time, but is again employed both in Europe and this country to some extent, especially in a deranged condition of the digestive organs connected with an abnormal state of the liver, and in dropsical effusions arising from the same cause. In habitual costiveness dependent on a want of due biliary secretion it acts with peculiar benefit, and as an adjuvant to more active remedies; where the liver is indurated, it has been prescribed with advantage. It has been employed, likewise, in affections of the spleen, uterine obstructions, chronic cutaneous disorders, &c. Where its diuretic effect is required, it is best given in combination with supertartrate of potash. Although belonging to the lactescent plants, it does not display any narcotic properties.

It is administered in the form of decoction or extract. The first is made with two ounces of the root, or whole plant, boiled in two pints of water down to one half; the dose is about a wineglassful. The extract, which is the most general mode of giving it, is very often badly prepared, and almost worthless; when good, it is of a brown colour, and not blackish, wholly soluble in water, and of a bitter and somewhat aromatic taste. The dose is from ten grains to half a drachm.

The leaves of the dandelion are much used in the spring as greens and salads, and when blanched, closely resemble endive; the roots are employed in some parts of Europe as a substitute for coffee, like those of the chicory.

Lactuca.—*Linn.*

Heads few to several-flowered. Scales of the cylindrical, calyculate-imbricated involucre in 2—4 series; the exterior the shortest. Receptacle naked. Achenia ob-compressed, flat, wingless, glabrous, abruptly produced into a filiform beak. Pappus of numerous soft, capillary, white bristles, in several series.

A genus of caulescent herbs, most of which are peculiar to the northern hemisphere, with entire or pinnatifid leaves and paniculate heads. The flowers are of various colours, even in the same species.

L. sativa, *Linn.*—Leaves not concave, erect, oblong, narrowed at base, smooth at the midrib. Stem elongated, leafy.

Linn., *Sp. Pl.* 1118; *Flore Med.* t. 213; Stephenson and Churchill, i. 12.
Common Names.—Lettuce; Garden Lettuce.
Foreign Names.—Laitue, *Fr.;* Lattuca, *It.;* Lattich, *Ger.*

Description.—The number of varieties of the garden lettuce are so great, and differ so much from each other, that all that can be said that will apply to the whole of them is, that the leaves are large, milky, frequently wrinkled, usually of a pale-green, but varying to a light-red. The radical leaves are roundish and toothed at the margin; those of the stem obovate or cordate. The stem is round, leafy, corymbiform at top, with numerous, bright, yellow flowers.

The native country is unknown, and it is supposed by some botanists to be an accidental variety from some other species, but perpetuated by cultivation, from a very early period, for it was well known to the ancients, and was extensively used as an article of food, as well as a sedative medicine; thus, besides the well-known fable of Venus, after the death of Adonis, using a bed of lettuce leaves to calm her mind and soothe her grief, Galen states, that when he suffered much from wakefulness, he relieved it by eating a let-

tuce at night; and Celsus says "somno vero aptum est lactuca, maximaque æstiva, cujus cauliculus jam lacte repletus est." The part now employed is the inspissated juice or *Lactucarium*. This was employed by the ancients, but its use was forgotten, until about the close of the last century, Dr. J. R. Coxe again called the attention of the public to it, in a paper in the Transactions of the American Philosophical Society, iv. 387; but little notice was taken of his communication, until in 1810, Dr. Duncan of Edinburgh again brought the subject before the medical profession, and detailed his experiments with it, though he wholly neglected to notice the previous labours of Dr. Coxe. It was now extensively used both in England and on the continent of Europe, and has since been admitted as an officinal article in all pharmacopœias. Two kinds are employed: the true *lactucarium*, which is the inspissated juice obtained by wounding the plant, permitting the exudation to concrete; and the *thridace* of most writers, which is the expressed juice evaporated to a due consistence, and hence contains all the secretions of the plant that can be forced out by pressure. The article used by Dr. Duncan differed from both these, being a spirituous extract.

Lactucarium, as found in the shops, is in roundish, hard masses, of a brown colour, with a narcotic odour, and a bitter, unpleasant taste. According to Buchner (*Pereira*, ii. 413), it contains an Odorous matter, Lactucin, Gummy extractive, soft Resin, Myricin, Gluten, &c. The lactucin or bitter principle is probably the efficient constituent. There is no trace of morphia to be detected.

Medical Properties.—Lactucarium is anodyne and sedative, and may be administered where opium is contra-indicated, either from idiosyncrasy, or where there is much excitement of the system. It is not, however, as certain in its effects as opium, but still forms a valuable addition to the class of sedatives, more especially, as from some experiments it appears to possess the power of diminishing the quickness of the pulse, and at the same time increasing its tone; hence it is much prescribed in Germany in palpitations of the heart. It also has some diuretic powers, and has been given with success in dropsy; and as a calmant in coughs it is fully equal to opium. It is but seldom used in this country, especially since the introduction of morphia and its preparations. It is given in substance in doses of two to five grains, and in tincture in those of twenty drops to one drachm, which latter quantity contains six grains of lactucarium.

Another species, the *L. virosa*, or wild lettuce of Europe, is possessed of the same properties, but affords nearly three times as much Lactucarium as the cultivated species. No experiments have been made with the wild lettuce of this country, *L. elongata*, but as it abounds in a bitter milky juice, and is common in all the States, it is worthy of attention.

Group XXVI.—Campanales.

Order 62.—CAMPANULACEÆ.—*R. Brown.*

Calyx superior, usually 5-lobed, persistent. Corolla monopetalous, inserted on the top of the calyx, usually 5-lobed, marcescent, regular, æstivation valvate. Stamens inserted into the calyx, alternately with the lobes of the corolla, which they equal in number. Anthers distinct, 2-celled. Pollen spherical. Ovary inferior, with 2 or more many-seeded cells, opposite the stamens or alternate with them. Style simple, hairy. Stigma naked, simple, or with as many lobes as there are cells. Fruit dry, crowned by the withered calyx and corolla, dehiscing by lateral apertures or by apicial valves, always loculicidal.

Seeds numerous, attached to an axile placenta; embryo straight, in the axis of a fleshy albumen.

Fig. 187.

Campanula.

An order of herbs or suffruticose plants, yielding a white, milky juice. The leaves are mostly alternate, simple, or deeply divided, and exstipulate. They are chiefly natives of the northern hemisphere, and are scarcely known in hot climates. Many, however, are found at the Cape of Good Hope. A. De Candolle states that of three hundred species, only nineteen are natives of the tropics, and that, with a single exception, all the species of the northern hemisphere open their capsule by lateral apertures, whilst those with an apicial dehiscence inhabit the southern.

The most striking character is the acrid, milky juice; but the roots and young shoots of some of these plants are used for food. The chief value of them are as ornaments to the garden, for which purpose many of them are cultivated. Some of them have, however, been used in medicine. The roots of *Phyteuma* are said to be antisyphilitic, and a species of the Alps is stated by Dr. Larbalestier (*Mem. Soc. Roy. Med.* 343) to be beneficial in cancerous affections. It is sudorific and purgative. The young shoots of *Canarina campanula* are employed as an article of food in the Canary Islands. Among the species of *Campanula*, the *C. glomerata* is stated by Martius (*Bull. Sci. Med.*, xiii. 354) to be valued in Russia as efficacious in hydrophobia. The roots of several of them, as *C. liliifolia*, *C. rapunculus*, and *C. trachelium* are also eaten. The latter plant is also considered to be astringent and vulnerary. That of *C. glauca* is in high repute in Japan, where it is considered to be scarcely inferior in tonic powers to the ginseng. *Wahlenbergia graminifolia* is used in the south of Europe as a remedy in epilepsy; and *W. linarioides* is thought efficacious in tormina by the natives of Chili.

Order 63.—LOBELIACEÆ.—*Jussieu.*

Calyx 5-lobed, more or less adherent to the ovary. Corolla persistent, irregularly 5-cleft, usually appearing bilabiate, cleft on one side nearly or quite to the base. Stamens 5; the upper part of the filaments and the anthers coherent into a tube; pollen ovoid. Ovary inferior or semi-superior, supporting a single style with a fringed stigma. Fruit capsular, 2—3 rarely 1-celled, usually dehiscing at the apex. Seeds numerous, with a fleshy albumen and straight embryo.

This order consists of suffruticose or herbaceous plants, often yielding a milky or acrid juice, and having alternate leaves, without stipules. The flowers are usually axillary, solitary, or racemose. They are all dangerous plants, belonging to the acro-narcotic class. Besides those belonging to *Lobelia*, *Tupa feuillæi*, a shrubby plant, occurring in Chili, is said by Lesson (*Voy. Med.* 167) to be so acrid and poisonous, that if, after touching it, the hand is applied to the eyes, a violent ophthalmia will ensue; taken internally it causes vomiting, great pain, and death. Feuillée says that even the odour of the flowers will produce vomiting (*Plant. Med.*, ii. 739). *Isotoma longiflora*, a native of the West Indies, is possessed of equally virulent properties. In some of them this milky exudation is milder; thus the *Siphocampylus caoutchouc* of South America furnishes gum elastic.

Lobelia.—*Linn.*

Calyx 5-lobed. Corolla irregular, 5-parted, cleft on the upper side nearly to the base. Anthers united. Stigma 2-lobed. Ovary inferior or semi-superior, and somewhat free. Capsule 2-valved, many-seeded.

A genus under this name was established by Plumier, and dedicated to Lobel; but he included a great number of dissimilar plants, the best known of which Linnæus retained under Plumier's name, and placed the others in a new genus under the appellation of Scævola. It contains a great variety of species, several of which are natives of the United States. They are all possessed of very active qualities, and some of them are highly poisonous, but only one of them is officinal.

L. inflata, *Linn.*—Stem erect, hairy. Leaves alternate, sparse, oval, nearly sessile, serrate, hairy. Flowers in slender racemes, the pedicels with an acuminate bract. Capsule ovoid, inflated.

Linn., *Sp. Pl.* 1006; Barton, *Veg. Mat. Med.* i. 181; Bigelow, *Med. Bot.* i. 177; Rafinesque, *Med. Flor.* ii. 22.

Common Names.—Lobelia; Wild Tobacco; Indian Tobacco.

Foreign Name.—Lobelie enflée, *Fr.*

Description.—Root biennial, fibrous, yellowish-white. Stem erect, from six inches to two feet high, angular, very pubescent or sometimes hairy, and much branched towards the top. Leaves scattered, alternate, sessile, ovate, or oblong, unequally serrate, and hirsute. The flowers are numerous, in terminal racemes, and supported on short peduncles, each arising from the axil of a small bract. The calyx is 5-toothed, the segments being linear and as long as the corolla. The corolla is of a pale-blue colour, monopetalous, but cleft on its upper side nearly to its base, bilabiate; upper lip 2 and lower lip 3-toothed. Capsule ovoid, inflated, striated, crowned by the persistent calyx, 2-celled, and containing numerous, small seeds.

The Lobelia is very common throughout the United States, in neglected fields, along road-sides, and the edges of woods. It flowers in July, and continues in bloom until destroyed by the frost. Some difference of opinion exists as to its duration; Linnæus, Pursh, and others considering it as an annual, Barton and Rafinesque as a biennial, and Elliott as a perennial. As far as my observation extends it is both annual and biennial in the Middle States, but more generally the latter. The whole plant is endowed with active properties, but the leaves and capsules are to be preferred. It should be gathered about August and September, and dried in the shade. It has a somewhat unpleasant odour, and an acrid, burning, nauseous taste, which is at first faint, but soon becomes excessive. It gives out its properties both to water and alcohol; but heat destroys, in a great measure, its active qualities.

It was known to the aborigines, and employed by them both in sickness and in their preparations for their great ceremonies. The first writer that noticed it was Schoepf, who merely says that the root is astringent, and used in ophthalmia. The next accounts of it are from Dr. Cutler and Dr. B. S. Barton; but the celebrated Samuel Thompson claims, in his Guide to Health, to have discovered its properties as early as 1790, since which it has been experimented upon by a number of physicians, and is admitted as officinal. The chemical constitution of Lobelia has been several times examined; Dr. Colhoun was the first to announce the presence of a peculiar principle in it (*Jour. Phil. Coll. Pharm.*, v. 300). It was also experimented upon by Dr. Pereira; but the most satisfactory investigation of it has been made by Mr. William Procter (*Amer. Jour. Phar.*, iii. and vii.); he found in it a peculiar principle, *lobelina*, Lobelic acid, a Fixed oil, Resin, &c. Lobelina is a principle analogous to nicotina; it is semi-fluid, of a light-yellow colour, and lighter than water, and occurs in very small proportions in the plant; most plentifully, however, in the seeds.

Fig. 188.

L. inflata.

Medical Properties.—These have not been sufficiently tested, and some difference of opinion exists as to them. It appears, however, that in small doses Lobelia acts as a diaphoretic and expectorant, and in larger, as a powerful and even dangerous emetic, whilst in still larger, its effects are those of an active acro-narcotic poison. The Thompsonians, on the contrary, deny that it has any narcotic effects, and assert that it is a perfectly safe medicine, although Thompson himself was tried in 1809 for the death of a person to whom he had administered this article. It also displays diuretic and cathartic properties.

The principal employment of Lobelia, in the hands of regular practitioners, is as an antispasmodic, especially in asthma, the attacks of which it often relieves, or even removes, even in doses not sufficient to cause vomiting. It was as a remedy in this complaint that it was first brought forward by Dr. Cutler, and has since proved highly beneficial in the hands of others, but, like everything else, sometimes fails. The best mode of administration, is in small doses, gradually increasing them, until headache or nausea ensue, when they are to be omitted entirely. It has also been given in croup, hooping-cough, &c., but with no marked success. As an emetic, except for extreme cases, it is too unpleasant and dangerous. When given as an enema, it causes the same symptoms as are produced by a similar use of tobacco, and

it was employed in this way with success in a case of strangulated hernia by Dr. Eberle. In fact it very closely resembles tobacco in its operation on the system, and requires much caution in its use.

It may be given in substance, tincture, or infusion. The dose of the first, as an expectorant, is from one to three grains; as an emetic, from ten grains to a scruple. The best form, especially in asthmatic attacks, is the tincture, the dose of which, as an expectorant, is from ten drops to a drachm; and double the last quantity, as an emetic or antispasmodic, to be repeated as occasion may require. The infusion is seldom employed, nor can it be recommended. Dr. Reece, who introduced its use into England as a remedy in asthma, employed it in the form of an oxymel.

A number of other species of Lobelia have been used in medicine; and among those of native origin, the *L. siphilitica* obtained much celebrity for its supposed powers in the cure of syphilis, for which purpose it was highly esteemed by the Indians, and the knowledge of its virtues long kept a secret among them, but was at length communicated to Sir Wm. Johnson, who transmitted an account of it to Europe. It did not, however, attract much attention until Kalm, who also heard of its reputed efficacy among the Indian tribes in Canada, again brought it before the profession, and induced somewhat extended trials of it, the results of which were at first thought to fully justify the character bestowed upon it; and it was highly praised by Linnæus, Havermann, and Depau. But subsequent experiments have by no means confirmed their statements; and it is now seldom or never used, though it is certainly an active article, and applicable to the same kind of cases in which the *L. inflata* has been found useful; it is less powerful, but appears to possess greater diaphoretic and diuretic powers than that plant. From an analysis by M. Boissel, it is shown to contain a fatty, butyraceous matter, sugar, mucilage, a volatile bitter substance, some salts, &c.

The *L. cardinalis*, another indigenous species, and one of the most beautiful of the genus, possesses much the same properties as the last, and is also said to be anthelmintic, and to be equal to the Spigelia.

Group XXVII.—Ericales.

Order 64.—PYROLACEÆ.—*Lindley.*

Sepals 5, inferior, persistent. Corolla slightly monopetalous, hypogynous, regular, deciduous, 4—5-parted, æstivation imbricated. Stamens hypogynous, twice as many as divisions of corolla, those opposite to the petals often destitute of anthers; anthers 2-celled, opening by pores. Ovary superior, 4—5-celled, many-seeded, with a hypogynous disk. Style solitary, declining. Fruit capsular, 4—5-celled, dehiscent, with central placentæ. Seeds numerous, very small, with a loose, winged skin. Embryo minute at the base, of a fleshy albumen.

A small order of herbaceous plants, rarely suffruticose, with simple, entire, or dentate leaves. They are found in North America, Europe, and the north of Asia. Their properties are those of the tonics, and they also appear to act powerfully on the urinary organs. The various species of *Pyrola* are considered as vulneraries, and are also employed in domestic practice as sudorifics, astringents, and antispasmodics. *Galax rotundifolia* is vulgarly called Carpenter's leaf, from its supposed vulnerary powers in healing wounds and bruises.

CHIMAPHILA.—*Pursh.*

Calyx 5-toothed. Petals 5. Style very short, concealed in the umbilicus of the ovary. Stigma annulate, orbicular, with a 5-lobed disk. Filaments stipitate. Capsule 5-celled, dehiscent at the apex, margins unconnected.

This genus was established by Pursh for two species of native plants, previously included in Pyrola, but the change had been previously indicated by Michaux. It consists of small perennial, evergreen herbs, common to the north of Europe, Asia, and to this country.

C. UMBELLATA, *Pursh.*—Leaves cuneate-lanceolate, serrate. Flowers somewhat umbellate. Filaments smooth. Bracts linear, awl-shaped.

Linn., (*Pyrola,*) *Sp. Pl.* 568; Pursh, *Fl. Am. Sep.* i. 300; Barton, *Veg. Mat. Med.* i. 17; Bigelow, *Am. Med. Bot.* ii. 15; Rafinesque, *Med. Flor.* 1; Stephenson and Churchill, ii. 93.

Common Names.—Pipsissewa; Winter-green; Ground-holly, &c.

Fig. 189.

C. umbellata.

Description.—Root perennial, long, creeping, and of a yellowish colour. Stems from three to six inches high, generally erect or semi-procumbent. Leaves in irregular whorls, of which there are usually two on each stem; sometimes they are alternate or irregular. They are lanceolate, somewhat wedge-shaped, narrowed towards the base, much serrated at their edges, coriaceous, and of a shining dark-green colour. The calyx is small, 5-parted, and persistent. The corolla consists of five roundish, concave, spreading petals, of a white colour, tinged with red, and have an agreeable perfume. The stamens are ten, the filaments subulate and smooth, with large, purple, bilocular anthers. The ovary is roundish, covered with a viscid exudation, supporting and partly enclosing a very short style with a crenate stigma. The capsule is 5-celled, the cells dehiscent at top, persistent. Seeds small, numerous.

The Winter-green is found in the northern parts of Europe, and Asia, but more plentifully in this country from Canada to Florida. It is generally met with in shady situations, in a loose, sandy, but tolerably rich soil. It flowers in June, and ripens its fruit in the autumn, the persistent capsules of the last season being generally found on the plant when in flower. The whole plant is officinal. The fresh leaves have a somewhat fragrant odour when bruised, but when dried have scarcely any smell; their taste is bitterish and astringent, but somewhat aromatic. According to an analysis by Wolf, it contains Bitter extractive, Resin, Tannin, some salts, &c.; of which the bitter extractive is in the largest proportion, and is probably the active principle, though there also appears to be some acrid and volatile constituent, as the fresh leaves, when bruised and applied to the skin, will cause redness, and even vesication; this was first noticed by Dr. B. S. Barton (*Collections*, 31), and is confirmed by the subsequent observations of Drs. Mitchell and Somerville.

Medical Properties.—The Winter-green is diuretic, tonic, and astringent. It was employed among the Indians, and was made known by them to the early settlers, by whom it was in popular use long before it was noticed by any writer. The first notice of it was by Schoepf, who says that it is astringent, styptic and tonic, but it was not properly examined before 1803, when Dr. Mitchell published an inaugural dissertation on it; however, it attracted little attention from the profession, until Dr. Somerville of the English army gave the results of his trials of it in the 5th vol. of the Medico-Chirurgical Transactions, as a remedy in dropsy, since which time it has been extensively employed. It has proved especially beneficial in dropsical cases where there is much debility and loss of appetite, as its tonic powers are here as useful as its diuretic; but although efficacious in these cases, it cannot be relied upon as a curative means to the exclusion of more active remedies.

It has also proved beneficial in the same disordered states of the urinary organs to which uva ursi is applicable, and is generally to be preferred to that article, as it is less apt to offend the stomach. There is some evidence that it has proved useful in scrofulous complaints, but does not appear to exercise more curative influence than many other of the vegetable tonics. One of its principal uses among the Indians was in the treatment of rheumatism, for which purpose they employed it in a strong and hot decoction so as to induce copious perspiration. Dr. B. S. Barton also states that it was extensively prescribed during the revolutionary war, in "camp fever," and with good effect, as a diaphoretic. Its chief use evidently is as a diuretic, and at the same time has a tonic effect on the digestive organs, and is therefore of great value in certain cases of dropsical effusions, and chronic diseases of the urinary organs.

It is generally given in decoction, made with two ounces of the bruised leaves boiled in three pints of water down to a quart, of which a pint may be given in the twenty-four hours. A very good plan of administration is in a fermented decoction, especially when it is administered in scrofulous

diseases (*Carson's Pereira*, ii. 391). The extract has also been much praised by many practitioners, in doses of ten or fifteen grains.

The other species, *C. maculata*, is probably possessed of identical powers, though there is a popular prejudice against it, so much so, that it has received the name of *Poison Pipsissewa*. Dr. Mitchell, however, thinks that it is wholly inert, but this is not more likely to be the fact than the opposite supposition, from the close correspondence of its sensible qualities with the Winter-green.

Order 65.—ERICACEÆ.—*Lindley*.

Calyx 4—5-cleft, superior or inferior; persistent, 4—5-lobed. Corolla monopetalous, lobed like the calyx, with an imbricated æstivation. Stamens distinct, equal in number to the lobes of the corolla, or twice as many. Anthers 2-celled, opening by pores. Ovary superior or inferior, many-celled. Style solitary, simple. Stigma simple, toothed, or 3-cleft Fruit capsular or baccate, 4—many-celled. Seeds numerous, small. Embryo straight in the axis of a fleshy albumen.

This extensive order has been variously viewed by different botanists, some considering its great groups as forming distinct orders, and others being of opinion that they are only entitled to a subordinate rank. In the present instance two of these have been placed under one head, rather from a wish of not needlessly increasing the catalogue of medicinal orders by the insertion of such as are unimportant, than from doubts of the validity of both the Ericaceæ and Vacciniaceæ.

Tribe 1. Ericineæ.—Ovary free from the calyx. Fruit capsular or baccate. Testa conformed to the nucleus.

An extensive group of shrubs or suffruticose plants, with alternate, rarely somewhat opposite or verticillate leaves, usually rigid, entire and evergreen, without stipules. The species are very abundant at the Cape of Good Hope, and are common in Europe, both Americas, less frequent in Asia, and almost wanting in Australasia. They have been divided into three sections, the *Ericidæ*, *Andromedidæ*, and *Rhododendridæ*. The species belonging to the first are seldom possessed of any active properties, their principal character being that of astringency; *Calluna vulgaris* or Heather, is used by tanners and dyers. *Erica arborea* was formerly considered to be alexipharmic, but is now never used in medicine.

In the second section greater powers are developed, and many of the species are tonic, diuretic, and even poisonous; for instance the shoots of *Andromeda ovalifolia* are poisonous to goats, those of *A. polifolia* are acrid-narcotic, and are fatal to sheep, and the same is the case with *A. mariana*, *nitida* and *angustifolia*. The powder on the leaves of *A. pulverulenta* and some others, is a powerful errhine. A Java species affords a peculiar oil, which is very volatile and heating, and is used in that country in rheumatic affections (*Ainslie*, ii. 107). The *Arbutus unedo* has a fruit somewhat like a strawberry, from which a wine is made in Corsica, which is said to be narcotic when drank in any quantity. *A. adrachne* is said to possess similar qualities. The fruits of some are edible, as those of *Gaultheria shalloon*, *G. hispida*, and *G. antipoda*, as are also those of *Brossæa coccinea*.

The plants of the third section are still more active; thus, besides *Rhododendron* and *Kalmia*, the different species of *Ledum* are very marked in their powers; the leaves infused in beer render it very heady, cause head-

ache, and even delirium. *Loiseleuria procumbens* has some reputation as an astringent.

GAULTHERIA.—*Kalm.*

Calyx campanulate, 5-cleft. Corolla ovate; limb somewhat 5-cleft, revolute. Filaments hairy. Receptacle 10-toothed. Capsule superior, 5-celled, covered by the calyx which becomes a berry.

A small genus of plants dedicated by Kalm to Dr. Gautier of Canada, and therefore erroneous in the spelling of its name, but as the mistake has existed from the first, and is now become settled by long usage, it would be inexpedient to attempt the change proposed by Rafinesque. All the species belong to temperate and cold climates, and are very remarkable for their berry, which is formed by the calyx assuming a soft and fleshy condition and covering the true fruit, which is a 5-celled capsule.

G. PROCUMBENS, *Kalm.*—Root creeping. Stems erect. Leaves few, terminal, coriaceous, obovate, serrulate. Flowers few; terminal on drooping peduncles.

Kalm, *Amœn. Acad.*, iii. 14; Barton, *Veg. Mat. Med.*, t. 171; Bigelow, *Med. Bot.*, ii. 27; Rafinesque, *Med. Fl.* i. 202.

Common Names.—Partridge-berry; Mountain Tea; Chicker-berry; Winter-green.

Fig. 191.

G. procumbens.

Description.—Root horizontal, creeping, slender. Stems several, erect, a few inches in height, slender, terminated by a few evergreen, ovate, smooth, shining, coriaceous leaves, which are paler underneath, with a few short, mucronate teeth. The flowers are few, terminal, on curved, drooping peduncles. The calyx is 5-toothed, with two bracts at base, finally changing into a fleshy covering to the fruit. Corolla ovate, 5-toothed, white or flesh-coloured. Stamens ten, rose-coloured, with plumose filaments, alternating with the short scales of the receptacle. Anthers bilobate. Style erect, filiform. Stigma obtuse. The fruit is a small, 5-celled, 5-valved, many-seeded capsule, enclosed in a fleshy calyx, which becomes of a scarlet colour.

The Partridge-berry is very common in hilly woods, in dry and sandy

soils throughout the United States, never found in rich alluvions or limestone plains. The specific name, like the generic, is erroneous, as the plant is creeping and not procumbent. It flowers from June to September, and from being well known and much employed in all sections of the country, has received a variety of local names, but is most generally called Partridge-berry, or Mountain tea. It was in common use by the Indians, but it has not been ascertained what properties they attributed to it. Schoepf speaks of it as an aromatic bitter, but the first correct notice of it as a medicine was by Kalm; it has, however, been introduced into the list of officinal articles only within a few years, though perhaps no one native plant has been longer in use in domestic practice. The leaves are the officinal part; these as well as all other portions have a peculiar and aromatic taste and smell, to which in the leaves is added some astringency, and in the berries some sweetness. The aromatic properties depend on a volatile oil, which is separable by distillation. This, which is the heaviest of the essential oils yet discovered, is also found in a variety of other plants, as the *Betula lenta*, some of the *Spireas*, &c. From the careful examination of it by Mr. Wm. Procter (*Am. Jour. Pharm.* viii. 211, and ix. 241), it is shown to possess acid properties, and to have the same composition as the *salicylate of methylene*. The oil, as found in the shops, has a more or less red colour, but when first distilled is colourless. Its Sp. Gr. is 1·173; its taste is burning and aromatic, and mixes with alcohol or ether in all proportions.

Medical Properties.—The Gaultheria is stimulant, aromatic and somewhat astringent, and is largely employed in domestic medicine in the form of tea, for a variety of complaints, especially in complaints of the bowels, and as an emmenagogue, as well as a restorative in cases of debility. The usual form, however, is that of the oil, which is the only one employed in regular practice, and then principally as a flavouring ingredient in mixtures. The essence or the oil dissolved in alcohol is in very general use throughout the country, as a carminative and stimulant. It is also said to be an ingredient in many of the quack syrups and panaceas, to disguise the character of their composition.

The leaves were used during the Revolutionary War as a substitute for China tea, and are still employed for this purpose in some parts of the country. The berries, which are aromatic and grateful to the taste, are also employed to flavour spirituous liquors.

Arctostaphylos.—*Adanson.*

Calyx 5-cleft. Corolla ovate-urceolate; limb 5-toothed, revolute, short. Stamens ten, included; filaments somewhat dilated at the base, hairy ciliate; anthers compressed, with two pores at the apex, laterally 2-awned, awns reflexed. Ovary globose-depressed, surrounded by three scales; style short; stigma obtuse. Fruit globose, drupaceous, 5—10-celled, cells one-seeded.

A small genus, separated by Sprengel from Arbutus, principally on account of the difference of its berry, but originally instituted by Adanson. They are small shrubs, with alternate, entire or dentate leaves, which are often persistent. Most of the species are North American.

A. uva ursi, *Linn.*—Stem procumbent. Leaves coriaceous, persistent, obovate, entire, shining. Flowers in small, terminal racemes. Bracteoles below the pedicels, small, obtuse.

Linn., (*Arbutus,*) *Fl. Lapp.* 162; Woodville, i. t. 70; Stephenson and

Churchill, ii. 91; Bigelow, *Med. Bot.* i. 66; Rafinesque, *Med. Flor.* i. 57; *Arctostaphylos*, Sprengel, ii. 287.

Common Names.—Uva Ursi; Bear-berry; Upland Cranberry, &c.

Foreign Names.—Busserolle, Raisin d'ours, *Fr.*; Uva orsina, *It.*; Bärentraube, *Ger.*

Fig. 191.

A. uva ursi.
1. Anthers. 2. Single anther, showing spurs.

Description.—Root perennial, long, fibrous. Stems procumbent, round, woody and branched, covered with a smooth deciduous bark. The leaves are numerous, alternate, evergreen, obtuse, obovate, entire, coriaceous, smooth, dark green and wrinkled above, and finally reticulated and paler beneath, supported on short petioles. The flowers grow in small clusters at the extremities of the branches, each on a short red peduncle, furnished with several minute bracts; they are usually six to twelve on each branch, drooping, and of a pale rose colour. The calyx is small, obtusely 5-toothed, and persistent. The corolla is ovate, smooth, transparent at the base, contracted above, with five short reflexed segments. The stamens have subulate downy filaments inserted at the base of the corolla, and reddish incumbent anthers, of two oval cells, opening by two terminal pores, and furnished with a pair of short horns or spurs. The ovary is roundish, bearing a cylindrical erect style, with a simple stigma. The fruit is small, globose, smooth, and of a scarlet colour, containing a mealy pulp of an austere taste, and five almost-united angular seeds.

The Uva ursi has a very extended range, being found in the northern parts of Europe, Asia, and America. It is usually found in dry, stony or sandy spots. It flowers from June to September, and ripens its berries during the winter. The leaves are the only part that is used in medicine. When dried they have a faint hay-like odour, and a bitterish astringent taste. The powder is of a yellowish-brown colour. They yield their properties to water and alcohol. On analysis they afford Gallic and Tannic acids, Resin, Extractive, Gum, some salts, &c. The tannin forms full a third of the whole, and is the active principle.

Medical Properties.—Uva ursi is astringent and tonic, and is thought to have a specific influence on the urinary organs, in the diseases of which it is principally used. It is thought by Clusius to be the part spoken of by Galen as useful in hæmoptysis, and having a red berry of an austere taste, but other commentators suppose this to have been the red currant. It is exceedingly doubtful whether it was known to the ancients, and very little is recorded respecting it, until it was introduced by De Haen as a remedy in diseases of the kidneys and bladder, and is still mainly employed for the same purpose, in certain cases in which it undoubtedly possesses considerable powers, though to be effectual its use must be persevered in for a long time. In chronic mucous discharges Prout speaks of it very highly, and his testimony is supported by that of many eminent practitioners, whilst on the other hand Sir B. Brodie and others declare that it has been much overrated. The truth seems to be, that it is uncertain in its effects, and even when successful, its beneficial operation is very slowly exercised. It has also obtained some

celebrity in calculous complaints. De Haen and Van Swieten speak of its good results in such cases, and Drs. B. S. Barton and Bigelow also notice it favourably as alleviating the symptoms. In consequence of its apparent powers in mucous discharges of the bladder, an extended trial of it was made by Dr. Bourne, of Oxford, in affections of the lungs, the results of which were decidedly encouraging, and subsequent trials of it by Mr. Davie prove that it is capable of allaying the irritability of the system, so constant an attendant on chronic diseases of the lungs.

As an astringent it is applicable to all the purposes for which the vegetable astringents are generally employed, as in leucorrhœa, diarrhœa, &c. It is administered in powder, in doses of a scruple to a drachm, but the decoction is generally preferred; this is made by boiling an ounce of leaves in a pint and a half of water down to a pint, the dose of which is a wineglassful several times a day. It has also been employed in extract, in doses of five to fifteen grains.

Rhododendron.—*Linn.*

Calyx 5-parted. Corolla sub-infundibuliform, 5-cleft. Stamens 5—10, declinate, opening by two terminal pores. Capsule 5-celled, 5-valved, opening at the summit.

This genus, which is now considered to include both Rhododendron and Azalea of Linnæus, is extensive, and is principally found in temperate or cold climates, or at such an elevation in more tropical latitudes as are equivalent to them in temperature; all the species are shrubby, some very small, whilst others attain the size of small trees.

R. chrysanthum, *Pallas.*—Stem decumbent. Leaves ovate, oblong, rough above, paler or ferruginous and smooth beneath. Umbels terminal. Corolla irregular, nearly rotate.

Linn., *Suppl.* 237; Stephenson and Churchill, ii. 80; Pallas, *Fl. Ross.* i. 44; Lindley, *Flor. Med.*, 378.

Common Name.—Yellow Rhododendron.

Foreign Names.—Rose de Siberie, *Fr.;* Rhododendro aureo, *It.;* Alprosen, *Ger.*

Description.—Stem from a foot to a foot and a half high, with numerous, decumbent, spreading branches, covered with a brown bark. The leaves are few, terminal, ovate, coriaceous, narrowed below, upper surface reticulated and rough, of a dark-green colour, the under pale or somewhat ferruginous, smooth, with their margins entire and involute. The flowers are large, yellow, and supported on long peduncles; they vary in number in each cluster from five to ten. The calyx is inferior, persistent, and deeply five-cleft. The corolla is also five-cleft, the lobes rounded, nearly equal, and spreading, the three upper ones somewhat the largest and marked with livid dots, whilst the two lower are unmarked. The stamens are ten, with equal, filiform, declining filaments, and oblong incumbent anthers. The ovary is five-sided, with a long slender style terminated by a five-lobed stigma. The capsule is ovate, somewhat angular, not tomentose, five to ten-celled, containing numerous minute, irregular seeds.

This plant is a native of the mountains of Siberia, flowering in June and July. It was first discovered and described by Pallas, who states, that in Siberia it is called *Schei* or tea, and that the leaves are used as we employ those of the Chinese plant. They are collected for use in September, when the capsules are ripe. When dried, they are inodorous, but have a bitterish, austere taste, and a decoction of them has an unpleasant smell, and a rough,

bitter and acrid taste. No chemical examination has been made of them, that I am aware of.

Medical Properties.—This plant has long been in use in its native country for a variety of complaints, but it was unknown to the medical profession until the publication of memoirs on the subject by Gmelin, Loefflers, Koelpin, and others. It appears, from these accounts, that the Siberians, when overcome by fatigue and cold, apply a decoction of the leaves to their limbs, to relieve pain and induce sleep. They also administer a strong infusion in rheumatism and other painful affections. This remedy occasions a sensation of heat, with a kind of intoxication, and a peculiar creeping and uneasy sensation of the affected parts. No fluid is permitted to be taken, until in a few hours alvine evacuations occur, and all the disagreeable symptoms caused by the medicine disappear, and with them those of the disorder.

It has since been used, with much success, in Russia, Germany, France, and England, not only in rheumatism but also in gout, though its use is principally confined to the two first of these countries. From the experiments of Dr. Home and others in England, it appears to be a stimulating diaphoretic, with some narcotic qualities, and also to possess the power of diminishing arterial action in a very marked manner. Sometimes it excites headache, vertigo, nausea, vomiting, and other unpleasant symptoms. From all that can be gathered, it is evidently a powerful remedy, and one that has proved beneficial in a class of diseases that often baffle the best-directed curative means, but the trials made with it are not sufficient to assign it a definite rank in the Materia Medica.

Mr. Churchill recommends the following mode of administration: half an ounce of the leaves are to be placed in twelve ounces of water, and gently *simmered, not boiled*, for four hours. The fourth of this infusion is to be given every four hours, the patient kept in bed, and the effects closely watched.

Another European species, the *R. ferrugineum*, is considered as poisonous, and to be possessed of the same properties as the above. Two of our native species, the *R. maximum* and *punctatum*, are said to be stimulant and astringent. Dr. B. S. Barton (*Collections*, 19) says the fruit is certainly a poison, and that the brown powder attached to the footstalks and in the seed vessels is considerably errhine, but he does not state, as is attributed to him, that it had acquired reputation in the cure of rheumatism, but refers to the *R. chrysanthum* as having that reputed power. Michaux observes, that the honey of bees, where these plants abound, is often poisonous.

Kalmia.—*Linn.*

Calyx 5-parted. Corolla hypocrateriform, border on the under side with ten cornute protuberances, and as many cavities, in which the anthers are concealed. Capsule 5-celled, many-seeded.

A North American genus of evergreen shrubs, with alternate or ternately verticillated leaves, which are persistent except in *K. cuneata*. The flowers are in terminal racemose compound corymbs. All the species are considered poisonous to cattle, though deer and goats feed on them with impunity.

K. latifolia, *Linn.*—Leaves on long petioles, clustered, coriaceous, ovate-lanceolate, entire, green on both sides; corymbs terminal, viscidly pubescent.

Linn., *Sp. Pl.* 545; Rafinesque, *Med. Flor.*, ii. 16; Bigelow, *Med. Bot.* i. 137.

Common Names. — Laurel; Mountain Laurel; Calico-bush; Ivy, &c.

Description.—A shrub from four to twelve feet high, usually with very crooked stems, covered with a light-coloured rough bark. The leaves are persistent, green on both sides, but somewhat paler beneath, coriaceous, entire, ovate-lanceolate, on long petioles, and in clusters at the ends of the branches. The flowers are very showy, in terminal compound corymbs, viscid, pubescent, with small subulate bracts. Corolla large, of a red colour at first, afterwards becoming lighter; the tube is short, and the limb is salver-shaped, with five short, acute lobes, and ten protuberances on the exterior, answering to the same number of cavities in which the anthers are lodged. The stamens are ten, long declined, and bear two-celled anthers, which have two terminal pores. The ovary is roundish, supporting a slender style, with an obtuse stigma. Fruit a dry capsule, which is five-celled and five-valved, the valves alternating with the divisions of the calyx. The seeds are numerous, and minute.

Fig. 192.

K. latifolia.

The Laurel is found in most parts of the United States, on hills and mountains, flowering in June and July, when it is extremely ornamental, from the contrast of its profusion of rose-coloured flowers with the dark shining green of its leaves. It is not officinal, but is said to be possessed of active qualities, though this is denied by some highly-esteemed authorities. Dr. Bigelow detected in the leaves only Tannin, a Resinous matter and Gum, but Dr. Stabler, in addition, found a Volatile oil of a disagreeable narcotic odour, and nauseous smell, which he supposes to be the active principle. (*Am. Jour. Pharm.* x. 241.)

Medical Properties.—Very little is known respecting the real properties of this plant; the general belief is, that it is extremely poisonous. Dr. B. S. Barton says, "It kills sheep and other animals; our Indians sometimes use a decoction to destroy themselves. In the county of Lancaster, an empiric has used the powdered leaves with success in certain stages of fevers, and in tinea capitis. A decoction of the plant, externally applied, has often cured the itch, but it must be used with much care, for thus applied it has been known to occasion disagreeable subsultus or startings and convulsions." (*Collections*, 29.) Dr. Thomas made it the subject of an inaugural dissertation in 1802, and gives a case of diarrhœa which was cured by a strong decoction of the leaves, in small doses. Thirty drops were given six times a day, but causing vertigo, the doses were limited to four times daily.

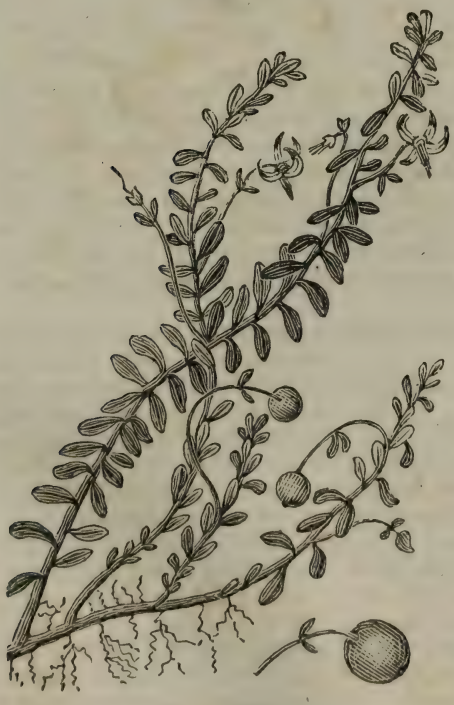
In Dr. Stabler's memoir, he states that he took a dose of ten grains of the powdered leaves, without any perceptible effect, and on increasing the dose to forty grains, about two hours afterwards, it still gave no indication of any power; but on trying a large dose of a strong decoction, it caused, in about half an

hour, vertigo, dimness of sight, great depression of the action of the heart, and cold extremities, without, however, producing any disorder of the mental faculties. He therefore concludes that this substance acts as a direct arterial sedative without any narcotic or acrid properties, and is suited to cases of hypertrophy of the heart, and other diseases where it is of importance to decrease the action of that organ; and from the tannin present that it is peculiarly fitted for cases of hemorrhage, dysentery, &c. These observations are interesting, and if confirmed by further experiments, will give the Kalmia a high station among the sedatives; they are well worthy of notice and of repetition.

Dr. Stabler proposes the following form of administration. Macerate two ounces of the leaves in a pint of alcohol for a week and strain; the dose for an adult would be thirty drops every two or three hours.

It is very generally believed that the flesh of birds feeding upon the leaves becomes extremely poisonous, and numerous interesting cases have been recorded by Drs. Mease, Shoemaker, Hayward, and others, of individuals suffering severely from having eaten partridges, in whose crops the laurel leaves were found. Notwithstanding the apparent certainty of the deduction, that the flesh had become deleterious from being imbued with the poisonous principle of the leaves, I am inclined to doubt the truth of the inference, and to attribute it to that peculiar state of animal decomposition in which an active poison is developed. The symptoms in the cases alludedto are precisely similar to those given in most works on Medical Jurisprudence as resulting from other meats in a certain stage of putrefaction, added to which hundreds of persons partake every year of partridges that have been feeding upon the laurel, without suffering any inconvenience, which would not be the case if the flesh became noxious from this cause.

Fig. 193.



O. macrocarpa.

Tribe 2. Vaccinieæ.—Ovary adherent to calyx, becoming a berry or drupe-like fruit.

Shrubs or small trees, often evergreen, with alternate undivided leaves, often with glandular notches, but without stipules. They principally occur in the more temperate portions of the world in swampy and subalpine situations. Some of the species from the mountains in Peru are said to be parasitic. They in general have edible and pleasant fruits, and their bark and leaves are astringent, and somewhat tonic.

The berries of the various kinds of *Vaccinium* are well known under the name of *Whortle* or *Huckle Berries;* those of Europe are derived from *V. myrtillus*, *vitis idæa*, and *uliginosum;* the juice of the latter is said to be somewhat

narcotic; those of the United States are furnished by *V. dumosum*, *frondosum*, and *tenellum*, &c. The *V. arboreum* affords an astringent fruit, but of good flavour; the bark of the root is very astringent, and has proved useful in bowel complaints. The leaves of all of them are astringent, and have been used to tan leather, and also as a remedy in sore mouth and diarrhœa, in form of a strong tea. In Popayan a kind of wine is made from the berries of *Thibaudia macrophylla* (Humboldt, *Nov. Gen.* iii. 270), and from the flowers of *T. quereme*, an aromatic tincture is prepared in Peru, as a remedy for toothache.

The fruit of *Oxycoccos*, called cranberries, are well known both in Europe and the United States; in the former they are obtained from the *O. palustris*, and in the latter from *O. macrocarpa*. Rafinesque notices two other native species, but they do not appear to be more than varieties. The American fruit is superior in size and flavour to the European. The plant is found as far south as New Jersey, on the seaboard, but extends to Carolina in the mountain districts. They grow in boggy and swampy ground, and are cultivated to some extent in some of the New England States. The berries are very acid and a little astringent, and are much used when stewed with sugar, in which form they are cooling and laxative. These berries keep better than most of the succulent fruits, and are largely exported to the West Indies and Europe.

Group XXVIII.—Ebenales.

Order 66.—AQUIFOLIACEÆ.—*De Candolle.*

Sepals 4—6, imbricated in æstivation. Corolla 4—6-parted, hypogynous, imbricated in æstivation. Stamens inserted on the corolla, alternate with the segments; filaments erect; anthers adnate, 2-celled, with a longitudinal dehiscence. Disk none. Ovary fleshy, superior, a little truncated, with 2—6, or more cells; ovules solitary, pendulous, often from a cup-shaped funiculus; stigma subsessile, lobed. Fruit fleshy, indehiscent, with from 2—6, or more stony seeds. Seeds suspended, nearly sessile; embryo small, in a large, fleshy albumen.

A small order of evergreen trees or shrubs, often with angular branches. The leaves are alternate, or opposite, simple, coriaceous, and exstipulate. The species are found in various parts of the world, especially in South America, the West Indies, and South Africa. Some occur in the United States, and but one in Europe. Their general character is that of astringency, but some have sudorific and emetic properties, and a decoction of the root of *Myginda uragoga*, is a most powerful diuretic, and even lithontriptic virtues are attributed to it (*Flor. Med. Antill.* iv. 81). The juice of the leaves of *Monetia barlerioides* is considered by the *Hindoo* practitioners as efficacious in catarrh, asthma, and phthisis (*Ainslie*, ii. 404). The most important medicinal species belong to *Ilex* and *Prinos*.

Ilex.—*Linn.*

Calyx small, 4—5-toothed. Corolla rotate, 4—5-parted. Stamens 4—5, alternate with the segments of the corolla. Ovary 4-celled, each with one ovule, style none; stigmas 4, sessile. Fruit, a berry, 1-celled, 4-seeded.

A genus containing a few species of shrubs and trees with alternate leaves, which are in some cases persistent and spinous at their edges. There is a

variation in the parts of fructification in some of the species, which render the genus difficult to be understood, and which will require it to be remodelled.

I. AQUIFOLIUM, *Linn.*—Leaves ovate, acute, spinous.

Linn., *Sp. Pl.* 181; *English Bot.* t. 496; *Flor. Med.* iv. t. 197; Lindley, *Flor. Med.* 393.

Common Name.—Holly.

Foreign Names.—Houx, *Fr.*; Alloro spinoso, *It.*

Description.—A small evergreen tree with a smooth, grayish bark. Leaves alternate, almost sessile, oval, of a deep, shining green, very rigid, the lower ones very spinous, the upper entire. Flowers small, yellowish-white, in clusters in the axils of the leaves. Calyx slightly hairy, small. The corolla is monopetalous, rotate, deeply four-cleft, segments obtuse, spreading; the stamens are erect, and alternate with the divisions. The ovary is globular, depressed, four-celled, with four sessile stigmas. The fruit is globular, umbilicated at the top, fleshy, scarlet, and contains four bony nucules.

The Holly is a native of many parts of Europe, sometimes attaining a considerable size, but in general is small; it is of very slow growth; the wood is very hard and heavy, and is employed for a variety of purposes. The inner bark is glutinous, and is used in Europe to prepare bird-lime, for which purpose it is suffered to soften by burying it in the earth for some days, after which it is beaten in a mortar, and well washed in water to separate the impurities. The viscous substance thus obtained is used to catch small birds, and was formerly employed as an application to gouty swellings. The leaves are the only part now considered as medicinal, and have long been in use in a variety of complaints. They have a bitter and disagreeable taste, but no odour; they contain, according to Lassaigne, Wax, a Bitter substance, Gum, several salts, &c.

Medical Properties.—They were first employed as a diaphoretic, and were considered as efficacious in small-pox, and other cutaneous affections, and were highly recommended by Paracelsus in gout, and have, within a few years, again been well spoken of in this complaint by Werlhof, and by Rousseau, in rheumatism. But it is as a remedy in intermittent fever that they have attracted the most attention, in consequence of the experiments of Dr. L. G. Rousseau (*Nouv. Jour. de Med.* xiv. 14), who having learnt that it was a favourite domestic medicine in intermittents, in various places in France, gave it an extended trial, and states that he was very successful with it even in the severest cases; numerous other practitioners have given the same testimony, and declare that they found it as efficacious as the Peruvian bark. On the other hand, Chomel states that he used it in thirty-two cases, and always without benefit; this result is too opposite to that of others to be received as definite, and may have arisen from the bad quality of the leaves employed by him, or other modifying influences; the testimony of all other practitioners is in its favour. It is given in powder, in doses of a drachm to a drachm and a half, two or three hours before the expected paroxysm, and it is stated that very often a couple of doses have proved sufficient to remove the complaint.

The berries are said to be more active than the leaves; they have an acrid taste, and according to those who have made use of them, are violently emeto-cathartic, causing copious watery evacuations.

The *I. opaca* of this country is very closely allied to, if not identical with the above species, differing from it so little, that it may be considered rather a variety, than a distinct species. The bark, berries, and leaves are employed in domestic medicine, to fulfil a variety of indications, but have not been used in regular practice; they, however, appear to be identical in their effects with those of the foreign plant.

Another native species, the *I. vomitoria* of Aiton, appears to be endowed with still more powerful properties. This is a native of the most Southern parts of the country, where it was held in high estimation among the Indians, who considered it as a holy plant, and employed it in their religious ceremonies and great councils to purge their bodies from all impurities. They called both this and the *I. dahoon* by the name of *Cassena*. The leaves, which were the part employed, were collected with great care, and formed an article of trade among the tribes. Dr. B. S. Barton (*Collections*, 38) says of it, "It is thought to be one of the most powerful diuretics hitherto discovered. It is held in great esteem among the Southern Indians; they toast the leaves and make a decoction of them. It is the men alone that are permitted to drink this decoction, which is called Black drink." These leaves are inodorous, and have a somewhat aromatic, acrid taste. In small doses the decoction acts as a powerful diuretic, and in large ones produces copious discharges from the stomach, bowels, and bladder. In North Carolina, on the seacoast, the inhabitants modify the deleterious action of their brackish water, by boiling a few leaves of Cassena with it. These plants require a careful examination as regards their true properties.

Fig. 194.

I. opaca.

The most celebrated of all the species is the *I. paraguayensis*, which furnishes the *Maté* or Paraguay tea, so extensively employed in South America, and forming so important an article of the internal commerce of that country. Its use there is as common as that of the China tea in this country, and it appears to possess almost the same properties, being slightly stimulating and tonic, these qualities depending on the presence of the same active principle in both plants. It is a small tree or shrub, with oval, cuneiform, or oblong and lanceolate, dentate glabrous leaves, somewhat resembling those of the orange. The smaller the plant, the better is the tea taken from it supposed to be. When gathered in the places of its growth, which are confined to Paraguay, it is torrefied by means of a peculiar kind of oven, and then packed in hides. (Robertson, *Four Years in Paraguay.*) As found in commerce, it is in the form of a greenish-yellow dust, mixed with broken leaves and stems. This infused in boiling water forms the *maté*, which is drank or rather sucked up by means of a tube. The herb is often mixed with some aromatic, as orange, or lemon peel, or cinnamon, to give it additional flavour. It is usually disagreeable to those unaccustomed to it, but a taste for it is soon acquired. (Ruschenberger, *Three Years in the Pacific*, 92.)

Fig. 195.

I. paraguayensis.

A full account of it is given in *London Journ. Bot.* i. 39. It is said that Theine has been detected in the leaves by Mr. Stenhouse. The *I. gongonha* is employed in Brazil in the same way. The fruit of *I. macoucoua*, in an unripe state, abound in tannin, and are used as a substitute for galls. (Martius, *Mat. Med. Bras.* 126.)

Prinos.—*Linn.*

Calyx 6-cleft, small, persistent. Corolla deeply 6-cleft, rotate. Stamens 6, filaments subulate, erect, shorter than the corolla. Anthers oblong, obtuse. Ovary superior, ovate, bearing a single style with an obtuse stigma. Fruit a berry.

An American genus, closely allied to *Ilex*, consisting of small trees or shrubs, with alternate, deciduous, or persistent leaves, and axillary or terminal flowers, which are small, and sometimes 5 to 8-cleft, with a similar number of stamina and seeds.

P. verticillatus, *Linn.*—Leaves deciduous, ovate, serrate, acuminate, pubescent beneath. Flowers often dicœcious, 6-parted. Fertile flowers aggregated; sterile ones axillary, subumbellate.

Linn., *Sp. Pl.* 471; Bigelow, *Am. Med. Bot.*, iii. 141; Barton, *Veg. Mat. Med.*, i. 203.

Common Names.—Winter-berry; Black Alder, &c.

Foreign Names.—Apalachine à feuilles de prunier, *Fr.;* Virginische Winterbeere, *Ger.*

Description.—A shrub from eight to fifteen feet high, with a bluish-gray or ash-coloured bark. The branches are alternate, horizontal, and spreading, furnished with ovate-acuminate leaves, dentate on their edges, of an olive-green, and smooth above, but pubescent beneath, especially on the ribs; they are alternate and petiolate. The flowers are small and white, and are clustered in axillary and lateral groups; rarely solitary. The calyx is small and persistent, and the corolla rotate, 6 and sometimes 7-cleft. The stamens are equal in number to the divisions of the corolla. The berries are globular, and of a bright-red colour, persistent after the fall of the leaves.

The Winter-berry is found in most parts of the United States, in damp situations and on the borders of water-courses, flowering in June, and ripening its berries late in the autumn. The officinal portion is the bark, which, when dried, is in slender pieces, more or less rolled, of a greenish-white colour internally, and of an ash-gray mixed with brown externally, brittle, and without odour; the taste is bitter and astringent, which is imparted to water. The berries have a sweetish, bitter taste, and are sometimes used. No chemical examination has been made of either of them.

Medical Properties.—The bark is tonic and astringent, and is much used in domestic practice. It was known to the Indians, and was first noticed by Schoepf, who says that "it is an antiseptic, and is used in gangrene and jaundice;" and it still enjoys much popular reputation as a local application to ill-conditioned ulcers and chronic cutaneous eruptions. It is also much employed in the treatment of intermittent fevers, but is far inferior in power to a number of other indigenous tonics. There is more evidence of its good effects in diarrhœa, in which it is extensively prescribed in some parts of the country; and also as a corroborant in dropsy, &c. Dr. Wm. P. C. Barton states that he "used both bark and berries on several occasions; and it is with no little satisfaction I bear testimony to its deserved claim to those commendations that have been bestowed upon it."

It is administered either in substance or decoction. The dose of the first is from thirty grains to a drachm, several times a day. The decoction, which is the preferable form, is made with two ounces of the bark to three

pints of water, boiled down to a quart, of which a gill is to be taken every two hours. It has also been employed in a saturated tincture, made from the bark or berries, or both combined.

Order 67.—EBENACEÆ.—*Ventenat.*

Flowers often diœcious, rarely sub-hermaphrodite. Calyx monopetalous, 3—7-lobed, persistent. Corolla monopetalous, 3—7-lobed, deciduous, regular, sericeous. Stamens variously inserted, twice to four times as many as the lobes of the corolla, unequal. Filaments short. Anthers free, introrse, 2-celled, dehiscing longitudinally. Ovary free, 3—12-celled, usually hispid. Styles usually with as many divisions as cells in ovary. Stigmas small, terminating the styles or the divisions of style. Fruit a berry, 3 to many-celled and seeded; or, by abortion, 1-celled and 1-seeded. Seed usually compressed laterally, with a coriaceous testa.

A small order, consisting of trees and shrubs, often with a dark-coloured wood, most common to tropical regions, but not wholly wanting in cold climates. The leaves are alternate, entire, exstipulate, and on short petioles. The flowers are in axillary, rarely terminal cymes. Juice not lactescent. The species are principally remarkable for the hardness of their wood, and for the edible character of their fruit. The *Euclea undulata* affords a saccharine berry, which is eaten by the natives of South Africa, and a kind of wine made from its juice (Thunberg, *Voy.*, i. 253).

Diospyros.—*Linn.*

Diœcious. Sterile flowers. Calyx 4—6-cleft. Corolla urceolate, 4—6-cleft. Stamens 8—16. Filaments often with 2 anthers. Fertile flowers, calyx and corolla as in male. Stigmas 4—5. Fruit 8—12-seeded.

A large genus, most of the species which are peculiar to the East Indies, consisting of trees and shrubs, with alternate, very entire leaves, and axillary, subsessile flowers; the female furnished with sterile stamens. Their general medicinal quality, as far as known, is astringency, which is very strongly marked in the species found in this country.

D. virginiana, *Linn.*—Leaves elliptical, obtusely-acuminate. Petiole and nervures pubescent. Racemes axillary, 1—3-flowered. Pedicels short, and with the calyx pubescent. Calyx 4-parted, lobes lanceolate. Corolla campanulate, glabrous, 4-cleft, lobes rounded.

Linnæus, *Sp. Pl.* 1510; Torrey, *Compend.* 375; Rafinesque, *Med. Fl.*, i. 153; Michaux, *N. A. Syl.*, ii. 219.

Common Names.—Persimmon; Yellow Plum; Date Plum.

Foreign Name.—Plaqueminier, *Fr.*

Description.—A tree from 20 to 60 feet in height, with a rugged, blackish bark, and alternate, spreading branches. The leaves are oval or oblong, acuminate, with an entire margin, smooth and shining above, and whitish or paler and reticulated beneath, supported on short, pubescent petioles. The flowers are lateral, axillary, mostly solitary, nearly sessile, or on a very short peduncle. The calyx is spreading, persistent, usually 4, but sometimes 5 or 6-parted. Segments lanceolate, shorter than the corolla, which is yellowish, and has as many segments as the calyx. Sterile and fertile flowers usually on different trees, but sometimes a perfect flower occurs, in which the stamina are double the number of the segments of the calyx, and the stigmas equal to these segments. The filaments are short, free, or inserted on the calyx, with bilobate anthers. The ovary is globular, supporting a very short style, with obtuse, spreading stigmas. The fruit is a round, dark-yellow, or orange berry, containing a fleshy, eatable pulp, and many compressed, hard seeds.

The Persimmon is found from New York to Louisiana, rarely above the 42° of latitude, but exceedingly common to the South and West. It flowers in May and June, but does not ripen its fruit until the first frosts in the autumn. Before this it is very astringent, but when fully ripe is sweet and pleasant-flavoured. This fruit, in several stages of growth, has been examined by Mr. B. R. Smith, who found that in a green state it contained Tannin, Sugar, a little Malic acid, and Woody fibre, &c.; that when ripe, the sugar has increased in quantity, as has also the malic acid, and the tannin has almost disappeared (*Am. Jour. Pharm.*, xii. 161). The wood is white and hard, and is used for a variety of purposes. A gum exudes from the bark in small quantity. The officinal part is the bark; this is very bitter and astringent; it has never been analyzed, but evidently contains much Tannin and Gallic acid (Woodhouse, *Inaug. Diss.*)

Fig. 196.

D. virginiana.

Medical Properties.—This bark is tonic and astringent, and is much employed in some parts of the country in the treatment of intermittent fevers, and as an astringent in complaints of the bowels. Dr. B. S. Barton (*Collections*, 11) says, "I used the bark in ulcerated sore throat;" and it has since been employed for the same disease with much benefit. I am inclined to believe that it is the most powerful of our native astringents. The unripe fruits have also been highly recommended by Dr. Mattauer (*Am. Jour. Med. Sci., Oct.* 1842) as an astringent, in the form of infusion, syrup, and tincture, in various forms of bowel disease and hemorrhage.

The ripe fruits are very grateful, and are said to possess some anthelmintic properties. They afford an alcoholic liquor on distillation, somewhat resembling brandy, and a kind of beer is prepared from them by forming the pulp into cakes with bran, drying them in an oven, and bruising them afterwards in water. The fruit varies much both in size and flavour; in some localities it is very large and delicious, whilst in others it is small and astringent even when fully ripe. This tree has never been cultivated, though it fully deserves it, for if it should improve in the same ratio as the plum, peach, &c., it would be a great addition to our autumn fruits, as it ripens at a time when most others have disappeared.

The other species of Diospyros are principally noted for the value of their wood. Ebony is the product of *D. ebenus*, *D. tessellaria*, *D. ebenaster*, *D. Roylei*, &c. Some of them also afford edible fruits, as the *D. chloroxylon* and *D. amara;* this latter bears berries as large as an orange, and are much used in China (*Annal. Soc. Linn. Par.* 1824). The *D. kaki*, of Japan, also

yields a fruit much esteemed in that country and China, but is said to be apt to cause dysentery (Kœmpfer, *Amœn. Acad.* 85). That of the *D. nigra* is very large, and is eaten in the Philippine Islands.

The *Embryoteris glutinosa*, a native of India, has a fruit of a rusty yellow colour, as large as an apple, affording a very astringent juice, which is so glutinous that it is used in Bengal to pay the bottoms of boats; it is also employed as an application to wounds.

Order 68.—STYRACACEÆ.—*Lindley.*

Calyx inferior or superior, 5-parted, persistent. Corolla monopetalous, often differing in the number of its divisions from those of the calyx; æstivation imbricated. Stamens unequal, more or less coherent; anthers innate, two-celled. Ovary superior or adhering to the calyx; three to five-celled; style simple; somewhat capitate. Fruit drupaceous, surmounted by or enclosed in the calyx, with one to five cells.

A small order, closely allied to *Ebenaceæ*, and by some botanists deemed a section of it, but differing in many important points, and especially in its general properties. It consists of trees and shrubs with alternate exstipulate leaves, generally dentate, and becoming yellow on drying. The flowers are axillary, either solitary or clustered, with scale-like bracts. The species are generally inhabitants of warm climates, a few only occurring in the cold latitudes.

The properties of the species are various. Some afford a balsamic resinous juice, as in *Styrax;* others have tinctorial properties and some degree of astringency, thus the *Hopea tinctoria* of the Southern States has a bitter and aromatic root, which is esteemed as a valuable stomachic, and the leaves, which have a sweet taste, dye wool and silk of a bright-yellow colour. The *Bobna laurina* is celebrated in Bengal for its bark, which forms a mordant for red dyes. The leaves of *Alstonia theæformis* of South America, are used in Santa Fé as a substitute for the Chinese article, and are said to be sudorific and stomachic. (*Plant. Æquin.* i. t. 51.)

Styrax.—*Linn.*

Calyx somewhat campanulate, entire or five-toothed. Corolla campanulate, three to seven-cleft. Stamens six to sixteen, exserted; filaments united to tube of corolla; anthers linear, two-celled, dehiscing internally. Style simple, with an obtuse, somewhat lobed stigma. Fruit dry, splitting imperfectly into two or three valves, with one to three stones. Seeds solitary, erect.

A genus of a few species of which one half are natives of North America. They all abound in a fragrant juice, which in two of the foreign species when in an inspissated state is officinal under the names of Storax and Benzoin.

S. officinale, *Linn.*—Leaves ovate, villous beneath. Racemes simple, shorter than the leaf.

Linn., *Sp. Pl.* 635; Woodville, t. 71; Stokes, *Bot. Mat. Med.* ii. 516; Lindley, *Flor. Med.* 390.

Common Name.—Storax tree.

Foreign Names.—Storax, *Fr.;* Storaco, *It.;* Storax, *Ger.*

Fig. 197.

S. officinale.
1. Style. 2. Stamens and ovary. 3. Fruit.

Description.—A tree of medium size, with irregular, alternate, round branches, which are tomentose when young. The leaves are deciduous, elliptical, entire, somewhat pointed, and resembling those of the quince; they are alternate, petiolated, smooth, of a bright-green colour above, and downy beneath. The flowers are in clusters at the ends of the young lateral shoots, of a white colour. The calyx and corolla are both downy, the latter is somewhat funnel-shaped, and divided into five deep, elliptical, obtuse, spreading segments; the stamens are ten, placed in a ring; the filaments subulate and inserted into the corolla, with yellow, erect, oblong anthers. The ovary is ovate, with a slender style and simple stigma. The fruit is a drupe of a globose form containing one or two angular nuts, convex on one side and concave on the other.

The Storax is a native of Syria and the Levant, and is naturalized in some parts of Italy, especially about Tivoli. It was known to the ancients, and is noticed by all their writers on medicinal plants; Dioscorides speaks of several kinds of it, and Pliny says that the Arabians used it as a perfume. The best now comes from Asiatic Turkey, and is obtained in a fluid state from incisions made in the bark; trees under six years old are never tapped, nor do they afford a product for more than twelve years. There are several varieties of Storax found in commerce, though not more than two are met with in our shops. The most esteemed is of a light colour, either in tears or amygdaloidal masses, and free from saw-dust or other impurities. The common Storax of the shops is in cakes, masses, or powder of a brown or reddish-brown colour, light and friable, and softening under the teeth; it appears to consist of saw-dust united by a liquid resin. The article called liquid storax is a semi-fluid, brown substance, with a smell resembling that of Balsam Peru. It is uncertain from what tree it is derived, but it certainly is not derived from our native *Liquidambar styraciflua* as has been stated. Dr. Wood (*Dispensatory*) was one of the first to point out that it differed from this balsam, and I can confirm his statement of the dissimilarity, from several times having had an opportunity of collecting the latter product, which is widely different from any liquid storax I have ever seen. It may be obtained from the *L. orientale* of Lamarck, which Jussieu thought was the source of the Storax. Landerer, as quoted by Pereira, however, affirms that it is derived from the Styrax by pressing the bark. Storax has a fragrant odour and aromatic taste, and imparts its odour to water, whilst, with the exception of the impurities, it is wholly soluble in alcohol and ether. It has been analyzed, and, according to its quality, contains different proportions of Woody fibre, Gummy extractive, Resin, Benzoic acid, Volatile oil, &c.

Medical Properties.—Storax is a stimulating expectorant, and was formerly much employed in asthma, chronic catarrhs, and affections of the wind-pipe; it has also been prescribed in amenorrhœa and mucous discharges from the genito-urinary organs. It is now seldom or never used except to

disguise the taste and smell of opium in certain compounds, and in the compound tincture of benzoin. From its fragrant odour when burning, it forms an ingredient of many fumigating pastilles.

2. S. BENZOIN, *Dryander.*—Leaves ovate, pointed, entire, downy beneath. Branches tomentose. Flowers in axillary, compound racemes.

Dryander, *Phil. Trans.* lxxvii. 308; Woodville, t. 72; Stephenson and Churchill, iii. 112; Lindley, *Flor. Med.* 390; *Benzoin officinale*, Hayne.

Common Names.—Benjoin tree; Benjamin tree.

Description.—A tree of some size and quick growth, with many strong, round branches, covered with a hoary and fine downy bark. The leaves are alternate on short petioles, ovate-acuminate, entire, smooth above and tomentose beneath. The flowers are in compound axillary racemes, shorter than the leaves, with angular downy peduncles and a few tomentose, oblong, deciduous bracts. The calyx is campanulate, downy, and minutely-toothed; the corolla is longer than the calyx and is 5-cleft, the segments are linear and obtuse, somewhat silky rather than tomentose. The stamens are ten; filaments connected below into a tube almost as long as the calyx and bearing linear, erect anthers. The ovary is superior, ovate-tomentose, with a slender style and simple stigma. The fruit resembles that of the last species.

The Benzoin tree is a native of Sumatra, Borneo, Siam, Java, &c., where it is also cultivated. Much confusion at one time existed as to the tree affording the Benzoin of commerce, for although it was known to Garcias, Sylvius, and others of the older botanists, they were unacquainted with its botanical characters, and subsequent writers were led into very glaring errors; thus Ray attributed this gum-resin to the *Laurus benzoin*, a North American shrub, and Linnæus, first to a species of *Croton*, and finally to a *Terminalia*, and it was not until about 1787 that Dryander ascertained its true origin. It has been considered as a true Styrax by most botanists, but is erected into a separate genus by Hayne (*Arzn. Gen.* ii.), under the name of *Benzoin officinale;* but there is nothing in its characters that authorizes this change, which is not admitted by De Candolle and other distinguished authorities.

The resinous balsam, known as Benzoin, is obtained from this tree in the following manner. When the trees are six or seven years old, incisions are made in the bark, from which the balsam exudes in the form of a thick, white, resinous juice. By exposure to the air it soon hardens, and is then separated from the bark by means of a knife or chisel. For the first three years the trees yield the purest product; this is of a white colour, inclining to yellow, soft and fragrant. Afterwards, for the next seven or eight years, an inferior kind is furnished; this is of a reddish-yellow colour, inclining to brown. The trees are then cut down and split into logs; from these a still worse sort is procured by scraping them; this is dark-coloured, hard, and mixed with parings of the wood and other impurities. The Benzoin is carried to the ports of the island in large cakes covered with mats. In order to pack it in chests for exportation, these cakes are softened by heat, and then broken into the fragments in which it is found in commerce. (Marsden, *Hist. Sumatra*, 134.)

There are several kinds of Benzoin; the best is in tears of a whitish colour, united by a reddish-brown connecting medium, but that generally met with is in brown or blackish masses. Good Benzoin has an agreeable and fragrant odour, and a somewhat acrid taste. When heated it gives out thick, white, pungent fumes, consisting mainly of benzoic acid. It is wholly soluble, when pure, in alcohol or ether, and imparts some of its properties to water. It has been often analyzed and found to consist of Volatile oil, Ben-

zoic acid, Resin, a Balsamic matter, Aromatic extractive, &c., in proportions varying according to the quality of the Benzoin experimented upon.

Medical Properties.—Benzoin, like the other balsams, is stimulant and expectorant, and also appears to have some influence on the sexual organs. It was formerly much employed in pulmonary diseases, but is now seldom prescribed except in chronic affections of the air passages, either in combination, or in the form of fumigation, being scarcely ever administered alone. It forms a constituent of several officinal preparations, and enters largely into the composition of numerous quack remedies for coughs, and as cosmetics, or vulneraries. Its principal employment is as a fumigating perfume, and for the manufacture of Benzoic acid.

A fragrant juice of a similar character is produced by other species, as *S. ferruginea*, *aurea*, and *reticulata*, and is used in Brazil as frankincense. (Martius, *Jour. Chim. Med.*, iii. 546.) It is probable that the article examined by M. Bonastre, under the name of *Storax de Bogota*, was the product of one of these species. (*Jour. de Pharm.*, xvi. 88.)

Order 69.—SAPOTACEÆ.—*Lindley.*

Calyx regular, persistent, 5 or 4—8-lobed, valvate or imbricate in æstivation. Corolla monopetalous, hypogynous, regular, deciduous; segments usually equal in number to those of the calyx, sometimes twice or thrice as many; æstivation imbricated. Stamens arising from the corolla definite, distinct; fertile ones equal in number to segments of calyx; anthers usually extrorse; sterile stamens as numerous as, and alternate with, the fertile. Ovary superior, many-celled, each containing a single ascending or pendulous ovule; style 1; stigma undivided, or sometimes lobed. Fruit fleshy, with several 1-seeded cells, or by abortion with one cell only. Seeds nut-like; with a bony shining testa, having a large hilum; embryo erect, large, in a fleshy albumen.

Trees or shrubs, often abounding in a milky juice, and having alternate, or sometimes almost verticillate leaves, entire, coriaceous, and exstipulate. They are principally natives of the tropics, very few being found in extra-tropical regions. They are more celebrated for their fruit, than for their medicinal or other properties.

The *Chrysophyllum cainito* bears the Star Apple, which is much esteemed in the West Indies, and the fruits of *C. macrophyllum*, *C. macoucou*, and *C. philippense*, are also used as food in their native countries. Those of several species of *Achras* are in still higher repute; the *A. sapota* furnishes a delicious product, the Sappodilla Plum, of which there are many varieties; these, besides their edible qualities, are in some estimation in the treatment of strangury. The seeds, pounded and made into an emulsion, are diuretic and purgative, and have been recommended in gravel and nephritic colic, but in overdoses cause much pain and even dangerous symptoms. The bark, as well as that of some other species, is tonic and febrifuge, and has been used as a substitute for Cinchona. The *Lucuma mammosa* bears the fruit called Marmalade, which resembles the last, but is not so much esteemed. The tree affords a milky juice, which Dr. Descourtilz (*Flor. Med. Antill.*, ii. 144) says is emetic, and caustic, and is used to destroy warts. The leaves of *A. dissecta* are employed in China, pounded with ginger, as an external application in paralysis.

Mimusops elengi, and *M. kaki*, yield somewhat astringent fruits, but are much used by the natives of the East Indies; the bark affords a gum; the seeds of the first afford an abundance of oil, which is used in painting, and is said to be useful in facilitating parturition. Various species of *Bassia* are

of much importance; the fruit of *B. longifolia* or Illupic tree, when pressed, gives out an abundance of oil, which is employed in India for food, soap-making, and burning; it is also thought beneficial as an external application in cutaneous disorders, and a decoction of the leaves and the milky juice, are used in rheumatic affections. The vegetable butter of India, called Ghee, is obtained from *B. butyracea.* (Royle, *Illus.*, 263.) The Butter Tree of Mungo Park is also supposed to be *B. Parkii;* the seeds of this produce, on expression, a solid oil, which is in general use in some parts of Africa, both for food and as an external application in cases of rheumatism, cutaneous eruptions, &c.; the flowers are also employed as food and to flavour spirituous liquors, which use is likewise made of those of *B. latifolia* in India.

The bark of several species of *Bumelia* is tonic and febrifugal; this is very marked in *B. nigra;* the fruit of *B. retusa* is milky, that of *B. lycioides*, a native of the Southern States, is austere, and is said to be useful in bowel complaints. The bark called *Monesia*, which is derived from South America, is said to be the product of a plant of this order; MM. Derosne, Henry, and Payen, who made a chemical examination of it, think it is a *Chrysophyllum*, but other naturalists suppose it is obtained from a *Rhizophora*, or an *Acacia*. It is certainly produced by a large-sized tree, and resembles the bark of one of the *Sapotaceæ*, more than that of any of the orders. It is of a dark-brown colour within, and of a grayish tint externally; having a short fracture. Its taste is at first saccharine, but soon becomes acrid and irritating. It has been found useful in diarrhœa, menorrhagia, leucorrhœa, and hæmoptysis, and has been tried with various success, in debility of the stomach, bronchitis, &c. It has also been applied topically in ulcers, hæmorrhoids, ophthalmia, &c. It is given in extract, in doses of sixteen to twenty-four grains, which are increased as occasion may require. (*Am. Jour. Pharm.*, xiii. 151; Dunglison, *New Remedies*, 438.)

Group XXIX.—Oleales.

Order 70.—OLEACEÆ.—*De Candolle.*

Flowers perfect, rarely dicœcious. Calyx monosepalous, persistent, generally 4-parted. Corolla hypogynous, monopetalous, 4-cleft, sometimes apetalous, æstivation valvate. Stamens 2, alternate with the segments of the corolla; anthers 2-celled, dehiscing longitudinally, ovary simple, 2-celled, cells 2-seeded; style 1 or 0; stigma undivided or bifid. Fruit drupaceous, berried or capsular, often by abortion 1-seeded. Seeds with dense, fleshy, abundant albumen, embryo straight.

This order is a small but important one; it consists of trees and shrubs with usually dichotomous branches, terminating by a conspicuous bud; the leaves are simple or sometimes pinnated, and alternate. The flowers are in racemes or panicles, either terminal or axillary, the pedicels opposite, with single bracts. It has been divided into several tribes from the difference of fruit; as *Fraxineæ*, where it is dry and samaroid; *Syringæ*, where it is dry and capsular; *Oleineæ*, where it is drupaceous and fleshy. The species are principally natives of temperate climates. Besides Manna and Olive Oil obtained from *Fraxinus* and *Olea*, several other products of this order require notice. The bark of the root of *Chionanthus virginica*, a native shrub, is tonic and febrifuge with some acro-narcotic properties, whence it is called *Poison ash;* this bark is also used in a cataplasm as an application to wounds and ulcers. The fruit of *Noronhia emarginata* is eaten in the Isles of France and Madagascar. The leaves of *Phillyrea latifolia* are used in

the South of Europe as astringent in ulcers of the throat and mouth; Lemery states that a cataplasm of the flowers made with vinegar is beneficial in headache (*Dict.* 678); the other species appear to have the same properties. The leaves and bark of *Ligustrum vulgare* or Privet are also astringent, and have been employed with success in the same cases as the above. All parts of *Syringa vulgaris* are very bitter, but the fruit and seeds are the most so; these have been given with benefit as a febrifuge, and Cruveilhier states that he obtained excellent results in intermittent fevers from the extract (*Med. eclairée par Vanat*). In the hands of other practitioners this article has failed, and is now never given.

Olea.—*Linn.*

Calyx small, 4-toothed. Corolla with a short tube, and 4-cleft limb. Stamens 2. Ovary bilocular; style short, stigma bifid or sub-capitate. Drupe baccate, oleo-carneous, by abortion with a single nut.

A genus of about twenty-five species, peculiar to warm and temperate climates, with opposite entire, rarely dentate, coriaceous leaves. The flowers are generally fragrant, white, racemose or paniculate. One species only affords a useful product, but it is probable that many of the others by cultivation would be equally important.

O. europæa, *Linn.*—Leaves lanceolate, entire, hoary beneath. Racemes axillary, dense. Branches angular, not spiny.

Linn., *Sp. Pl.* 11; Woodville, ii. 280; Stephenson and Churchill, i. 15; Lindley, *Flor. Med.* 547.

Common Name.—Olive tree.

Foreign Names.—Olivier, *Fr.;* Ulivo, *It.;* Oelbaum, *Ger.*

Fig. 198.

O. europæa.
1. Corolla. 2. Calyx. 3. Drupe.

Description.—A small tree, much branched, covered with a grayish bark. The wood is hard and compact, of a dark-yellowish colour, susceptible of a high polish. The leaves are opposite, nearly sessile, lanceolate, of a whitish-green colour, smooth on the upper surface and downy beneath. The flowers are in small clusters in the axilla of the leaves, on short peduncles, and furnished with small, obtuse bracts; the calyx is obtuse and 4-cleft; the corolla is white, monopetalous, spreading, divided into 4 ovate, obtuse segments. The stamens are two, shorter than the corolla, supporting large elliptical anthers, and a single, slender, erect style, with a bipartite stigma. The fruit is a smooth drupe, of a violet colour when ripe, of an unpleasant bitter taste, but abounding in a bland oil, and enclosing an ovate, oblong, rugose nut or stone.

There are several varieties of this tree, differing in the size and form of the leaves, and in the magnitude, colour and taste of the fruit. It is generally supposed that the olive is a native of Asia, but its cultivation having commenced before the existence of any de-

finite records, and having been introduced into Europe and there naturalized at a very early period, it is impossible to come to any exact conclusion as to the locality whence it was originally derived. According to Gibbon (*Decline and Fall*), "the Olive in the western world followed the progress of peace, of which it was considered as the symbol. Two centuries after the foundation of Rome, both Italy and Africa were strangers to that useful plant; it was naturalized in those countries, and at length carried into the heart of Spain and Gaul." It is constantly spoken of in the Bible, and frequent references are made to it by Homer, in both cases as a tree in general cultivation: and the varieties now known were equally common in former times, as Virgil enumerates three kinds, Cato eight, and Columella ten. No plant is of more easy cultivation, and it has the additional advantage that it flourishes in the most barren soils. The suckers are removed from the trees in the spring and autumn, when the ground is ploughed, or it is merely loosened round the trees. The plant begins to bear at two years of age, and at six is productive, and is almost of endless duration, as a plantation is still in bearing near Terni, in Italy, which is supposed to be the same trees spoken of by Pliny as growing there in the first century.

The Olive is cultivated with success in the old world, where the temperature of the coldest month is not under 42°, and that of the summer not below 72°. Thus in Europe it extends as high as latitude 44½°, whilst in America it would not flourish above 34°. There are three products of this tree that require notice, its gum, leaves, and fruit.

Olive Gum.—This is, properly speaking, a resinoid substance, exuding naturally from the bark, consisting of a peculiar matter, called *Olivine*, resin and benzoic acid; it was formerly used in medicine, but is now considered as of no particular virtue.

Leaves.—These contain tannin and gallic acids, and have been employed with some success as astringents and tonics, but are seldom prescribed in regular practice, but form a domestic remedy in much repute in some parts of Europe.

Fruit.—This is employed for two purposes, the first and most important for the expression of the oil contained in them, and secondly as an article of food; in the latter case they are prepared by pickling, and are used in an unripe state, being steeped in a weak solution of soda or lime, to deprive them of their bitterness, then washing them repeatedly in water, and finally preserving them in a strong solution of common salt, aromatized with bay leaves. Large quantities are imported into this country from Italy and France; these are made from the small variety (*longifolia*); those from Spain being prepared when the fruit is almost mature are oily and strong, and are not as much esteemed; they are from the large variety (*latifolia*).

Olive Oil.—The time for gathering olives for the purpose of extracting their oil, is just before they are fully ripe. If this be delayed until they are mature, the tree will bear only in alternate years. The quality also depends on the time of gathering; they should be carefully picked by hand, and the harvest completed, if possible, in one day. In France and Italy the oil is drawn from the fruit by presses and mills. The fruit is gathered just as it attains maturity, or when it begins to redden, and immediately carried to the mill, and care taken that the mill-stones are set at such a distance from each other as not to crush the nut of the fruit. The pulp is put in bags and moderately pressed; the product obtained is of the first quality, and called *Virgin oil.* The marc remaining is broken in pieces, moistened with water and again pressed; the oil from this second operation is of an inferior quality, but still fit for table use. The marc is again broken up, well soaked in water,

or somewhat fermented, and then re-pressed, by which is obtained a coarse oil, fit only for soap-making or for burning. At Gallipoli, where a large quantity of oil is made, principally for manufacturing purposes, the several operations are conducted in a very rude manner, and the oil obtained is of the coarsest kind, and is kept in large cisterns dug out of the rocks, until wanted for exportations (*Ulysses' Travels*). This is also generally the case in Spain, where the olives are beaten from the trees, and the ripe and unripe, sound and decayed, thrown together into a heap to ferment, then ground and pressed; by these means a large product is obtained, but it is rank and disagreeable.

According to De Candolle, one hundred pounds of olives afford about thirty-two pounds of oil, of which twenty-one is from the pulp, the remainder from the seed and woody portion of the nut. When first made, it deposits a white fibrous matter, formerly employed in medicine under the name of *amurca*.

The best table oil comes from the South of France and Tuscany. When good, it is an unctuous fluid, of a pale yellow or greenish-yellow colour, with scarcely any odour, and a bland and almost mucilaginous taste. When exposed to a temperature of 32°, it congeals and separates into two portions, one solid, called *Margarine* by Lecanu, and *Stearine* by Chevreul, and the other fluid, called *Elaine* or *Oleine*. It is composed of about 72 parts of the latter and 28 of the former. Olive oil is often adulterated, especially with that from the poppy, and of late years, it is said, very largely with lard oil; several plans have been proposed to detect these adulterations, the most simple of which is the exposure to cold, as the pure oil will solidify when cooled with ice, which neither of the adulterating oils will do. If the oil be adulterated with lead, which is sometimes the case, to obviate its rancidity, it may be detected by shaking one part of it with three parts of water impregnated with sulphuretted hydrogen, when a precipitate of the lead will ensue.

Medical Properties.—The medicinal qualities of olive oil are those of a nutrient, demulcent, emollient, and laxative. In catarrh and other pulmonary affections, it has been used as a demulcent in the form of an emulsion, but the oil of almonds is more generally employed in such cases. It is also occasionally recommended as a mild laxative, where there is much irritation of the intestinal mucous membranes; and as an antidote against certain poisons, among the rest where cantharides had been taken; but as it is an excellent solvent of the active principle of this drug, it augments the danger instead of mitigating it. Nor is it proper incases of poisoning with opium or its salts, with arsenic, copper, &c., in which it has been recommended, but is highly beneficial where poisonous doses of the alkalies have been taken, as it forms a soap with them.

Olive oil has enjoyed much reputation as an external remedy in the plague, and according to Mr. Jackson (*Hist. Morocco*), is of the greatest benefit, not only as a preventive but as a curative means, after the accession of the disease; but the trials made with it by several practitioners do not confirm his statement of its powers. It was also considered as an antidote against the bites of venomous serpents, but there are no just grounds for supposing that any reliance is to be placed upon it.

It is principally employed in the composition of liniments, ointments, cerates, and plasters, and is also frequently prescribed as a constituent of laxative enemata, where there is irritation of the lower bowels or adjoining parts. Its use as an article of food, or in the arts, is too well known to require comment, except to state that it is always improper for persons suffering from dyspepsia. The dose, when it is intended as a laxative, is from a drachm to an ounce or more.

Fraxinus.—*Linn.*

Flowers polygamous or dicœcious. Calyx 4-cleft or wanting. Petals either 4, cohering at base, oblong or linear, or wanting. Stamina 2. Stigma bifid. Fruit orbicular, compressed, winged above, 1-seeded by abortion, not dehiscing.

A large genus, including both *Fraxinus* and *Ornus* of most authors, but which are considered by the best authorities as merely forming sections. The species are trees and shrubs confined to the northern hemisphere. They have terete and sometimes tetragonal branches, and opposite, petiolate, pinnate leaves, with 2—7 pairs of leaflets, which are either petiolate or sessile, generally dentate, rarely entire. The flowers are racemose or paniculate.

F. ornus, *Linn.*—Leaves opposite, large; leaflets 3—4 pairs, ovate-oblong, acuminate, irregularly dentate. Panicles large and many-flowered. Flowers small and polygamous. furnished with a corolla. Fruit wedge-shaped, smooth and winged.

Linn., *Sp. Pl.* 1510; Woodville, i. 104, t. 36; *Ornus europæa*, Stephenson and Churchill, i. 53; Lindley, *Flor. Med.* 547.

Common Names.—Flowering Ash; Manna Tree.

Foreign Names.—Frêne à fleurs, *Fr.;* Avornello, Orniello, *It.*

Description.—A small tree, much branched, and covered with a smooth gray bark. The leaves are oblong, on channelled footstalks, and are pinnate and opposite; the leaflets are in three or four pairs, with a terminal one, opposite, acuminate, unequally serrate, smooth, and of a bright green colour. The flowers are produced in loose panicles at the extremities of the branches, on supra-decompound peduncles. The segments of the calyx are ovate; and the corolla consists of four, linear, pointed petals; the stamens are two, supporting long, yellow, incumbent anthers. The ovary is oval, with a very short style, and a notched stigma. The fruit is a pendulous, compressed samara, containing a single lanceolate, cylindrical, brown seed.

This tree is found in the South of Europe, especially in Calabria and Sicily. It is probable that it is the *Melia* of Theophrastus, and is the true *Fraxinus* of the Roman writers. It is from this tree that a portion of the Manna of commerce is obtained, but the largest portion is said to be the product of the *F. rotundifolia*, and to be also procured from the *F. excelsior*, and *F. parvifolia*. Cirillo (*Philos. Trans.* lxiii. 234) gives the following account of the mode of collecting it in Calabria. "In order to obtain the manna, those who have the management, in the months of July and August, when the weather is dry and warm, make an oblong incision, and take a piece off from the bark of the tree, about three inches in length and two in breadth; they leave the wound open, and by degrees the manna runs out, and is almost suddenly thickened to its proper consistence, and is found adhering to the bark. This manna, which is collected into baskets, and goes under the name of *manna grassa*, (*manna in sorts*,) is put in a dry place, because moisture and a damp atmosphere will soon dissolve it again. This kind is often in large, irregular pieces of a brownish colour, and frequently full of dust and other impurities. But when the people want to have a fine manna, they apply to the incision in the bark, thin straw or bits of shrubs, so that the manna, in coming out, runs upon these bodies, and is collected in a sort of regular tubes, and is called *manna in cannoli* (*flake manna*). When the summer is rainy the manna is always scarce and bad."

Houel (*Voy. Pittor. de Sicile*), gives much the same account of the mode of obtaining it in Sicily. No manna is produced in countries to the north of Calabria, though the tree will bear the climate of England. Some writers suppose the manna a natural product, but others insist that it never takes place except the tree be wounded by an incision, or punctured by insects.

Several kinds of manna are described, but the only varieties that come to this country, are the *flake*, and *manna in sorts*, the first of which is the purest, though by no means the most purgative; it is in irregular, unequal pieces, rough, light, and porous, of a yellowish-white colour, with a crystalline or granular fracture, of a slight peculiar odour, and sweet taste. The common or manna in sorts is in masses composed of whitish or yellowish fragments, united together by a soft, tenacious, brownish matter; this variety has a nauseous taste, which is the greater, according to the preponderance of the brown substance; where this latter forms the greatest portion, it has received the name of *fat manna*. Manna has been often analyzed; it consists of a peculiar sugar called *Mannite*, which is incapable of undergoing vinous fermentation, Sugar, Purgative colouring matter, Gum, &c.

The trees above noticed are not the only vegetables that furnish manna, or a product analogous to it. Thus, according to Burckhardt and other travellers in Arabia, the Bedouins make use of an exudation from the Tamarisk tree, resembling this substance; and that used in India is derived from a thorny shrub, found in abundance in the Arabian and Persian deserts: it is the *Alhagi maurorum*; a third kind is obtained from a species of *Eucalyptus*, growing in Australia; it is also furnished by the *Larix europæa*, the *Salix chilensis*, &c.; but none of these are equal to that from the *Fraxinus*. Mannite also exists in many vegetables, as in the celery, asparagus, melon, &c.; Ainslie (*Mat. Ind.* i.), after speaking of the various kinds of manna, observes, "whether any of these mannas may be the product of the insect called *Kermes mannifera*, I know not, but the inquiry might be interesting. Major Macdonald Kinneir mentions, in his Geographical Memoir on Persia, a sort of manna which the Persians call *guz*, and which may be procured in great quantities in Louristan; he adds, that it is obtained from a shrub, in appearance like a fennel, about four feet high, and is supposed to be produced by small red insects. These are seen in great quantities on the leaves."

Medical Properties.—In small doses, manna is nutritive, and in large ones laxative, and appears to increase in power with age; at least when first gathered, it is said to be eaten in some quantity, without affecting the bowels. The purest manna is not as purgative as the more inferior, for although mannite is laxative, the principal purgative principle resides in the brown viscous matter. It is now seldom administered to adults, except in combination with other substances, to disguise their taste, and also from the fact that when given in any quantity, it is apt to cause flatulence and griping. It is, however, much employed, especially in domestic practice, as a laxative for children. It is given either in substance, or dissolved in warm milk or water. The dose for an adult is from an ounce to two ounces, and for children, a drachm to two or three.

The bark of most of the species is bitter and astringent, and before the introduction of Peruvian bark, was much employed in the treatment of intermittent fevers; that most generally used was obtained from the *F. excelsior*, and the evidence in favour of its curative powers is very great. It was also recommended by Bergius as a febrifuge. The leaves are purgative, and are spoken of by Coste and Willemet as nearly equal to Senna (*Mat. Med. Indigen.* 36). The seeds, which are acrid and bitter, are said to be hydragogue and diuretic.

Group XXX.—Gentianales.

Order 71.—APOCYNACEÆ.—*Lindley.*

Calyx free, persistent, 5-parted. Corolla monopetalous, hypogynous, regular, 5-lobed, often with scales at the mouth, deciduous; æstivation contorted. Stamens five, inserted on the corolla, with the segments of which they are alternate. Filaments distinct. Anthers cohering firmly to the stigma, 2-celled, with a longitudinal dehiscence. Pollen granular. Ovaries 2 or 1—2-celled, polyspermous. Styles 2 or 1. Stigma single, contracted in the middle. Fruit a follicle, capsule, or drupe, double or single. Seeds with fleshy or cartilaginous albumen. Testa simple. Embryo foliaceous.

A very large order, composed of trees, shrubs, or herbs, abounding in a milky juice, and having opposite, sometimes verticillate, entire leaves, often with glands on or between the petioles, but no proper stipules. The species are principally tropical, most common in Asia; a few only are found in northern countries. They are generally fine and showy plants.

The whole order is suspicious, for although a few yield edible fruits, and some a nutritive and innoxious milk, the greater proportion are acrid and poisonous. Among the latter class, *Tanghinia venenifera* stands prominent; the kernel of the fruit, although not larger than an almond, being sufficient to destroy twenty men. It is a native of Madagascar. It was formerly used as an ordeal to ascertain the guilt of suspected persons, but the custom is now discontinued. (Hooker, *Bot. Mag.* t. 2968.) It has been analyzed by O. Henry, who found its active principle to be an alkaloid, which he calls *tanghinin* (*Jour. de Pharm.* x. 49). Dr. Ollivier made numerous experiments with the seeds, and ascertained that the tanghinin was narcotic, and that another white, crystalline substance, contained in them, was acrid and stimulating. It acts on the cerebro-spinal system. The different species of *Thevetia* are also very active. *T. neriifolia*, a native of the West Indies, has very poisonous seeds; these have been examined by Dr. Madianna, and found to be violently acro-narcotic, even in small doses. (*Ann. Lyc. Nat. Hist.* i. 86.) Descourtilz states that the bark is eminently febrifuge, two grains being equivalent to a full dose of Cinchona. (*Flor. Med. Antill.* iii. 40.) The seeds of *C. ahouai* have much the same properties, and its bark is narcotic and purgative. A poison in use among the ancient Mexicans, was probably derived from the *T. icotli.* Many of the *Cerbera* are very analogous in their action to the above; the *C. manghas*, a native of India, has emetic and poisonous seeds; in small doses even, they cause delirium (Horsefield, *Asiatic Jour.* 1819); the leaves and bark are considered as purgative, and the pounded fruit is applied externally in diseases of the skin (*Ainslie*, ii. 260); the other species partake of the same qualities.

Fig. 199.

T. venenifera.

The *Allamanda cathartica*, found in Surinam, is a violent emeto-purgative, and was prescribed with success in colica pictonum, in small doses. An infusion of the leaves also acts as a cathartic. (*Ainslie*, ii. 9.) *Couma guianensis*, a native of Guiana, affords an odoriferous resin, and the fruits are edible. The

wood of *Hancornia* and several others of the genera is as bitter as quassia. The root of *Rauwolfia nitida* is emeto-purgative, and the juice of *R. canescens*, mixed with castor oil, is employed as an external application in diseases of the skin. (*Flor. Med. Antill.* iii. 151.) The milky juice of *Hasseltia arborea* is used in Java as a violent purgative to destroy tape-worms, but is apt to cause inflammation of the bowels. The milk of *Plumiera alba* and others is used as a purgative, usually mixed with a vegetable acid, to mitigate its too powerful action; that of *P. drastica*, mixed with the milk of almonds, is given in Brazil in jaundice and chronic obstructions; and that of *P. phagedenica* is in repute in the same country as a vermifuge. (*Bull. Sci. Nat.* xxxiv. 64.) The exudation from *Cameraria latifolia* is so virulent, that it is used by the South American Indians to poison their arrows. (*Flor. Med. Antill.* iii. 187.) Numerous others of these plants are endowed with similar qualities.

In some species the poisonous properties are much diminished or disappear, and they become valuable as febrifuges and aromatics; this is the case with the *Ophioxylon serpentinum* of India, which is used by the Tellingoos as a febrifuge, and for the bites of venomous animals, and to promote delivery in tedious cases (Roxburgh, *Flor. Ind.*, ii. 530); it is also spoken of with praise by Rumphius, Burman, and others. The bark of *Alyxia stellata* resembles *Canella alba*, and may be used for the same purposes; it was experimented with by Blume at Batavia, and found beneficial as a stimulating tonic (Nees, *Archiv. apot.*); it is given in doses of half an ounce. The *Conessi* or *Malabar* bark is the product of the *Wrightia antidysenterica*; this is a valuable febrifuge and astringent; it is much used in India in dysentery (*Ainslie*, ii. 462). Alibert (*Nouv. Elem. Therap.*, i. 108) notices it, and states that the best mode of administration is in the form of an electuary; Virey (*Hist. Mat. Med.* 188) observes that it is eminently antidysenteric and febrifuge; it is usually given in decoction.

The milk of some of these plants, instead of being poisonous, is inert and potable; this is the case with that of the *Tabernæmontana utilis*, one of the cow-trees of South America, and is thick, sweet, and nutritious. Some of them produce caoutchouc, as the *Callophora utilis* and *Cameraria latifolia*, in South America; *Urceola elastica*, in India; and *Vahea gummifera*, in Madagascar.

As before mentioned, the fruits of some species are edible; besides those already noticed, these are, *Carissa carandas*, which furnishes a substitute for currants; *Hancornia*, the fruits of which are sweet, sub-acid, and vinous; to which may be added those of *Carpodinus*, *Melodinus*, &c. In Ceylon, where the natives suppose the Garden of Eden was situated, they point out the forbidden fruit, which is borne by a species of this order, *Tabernæmontana dichotoma*, in proof of which, the fragrance of the flowers, the beauty of the fruit, and it still bearing the marks of teeth; and although now poisonous, it only became so when Eve was tempted. (*Bot. Reg.* t. 53.)

Apocynum.—*Linn.*

Calyx 5-parted, lobes acute. Corolla campanulate, 5-cleft, lobes revolute, furnished at base with 5 glandular appendages, alternating with the stamina. Stamens inserted at the base of the corolla; filaments ligulate; anthers longer than the filaments, sagittate, somewhat connivent. Ovaries 2; style obsolete, stigma thick, acute and bilobate at the apex. Follicles long and linear. Seed comose.

All the species are herbaceous or suffruticose, and erect, with opposite membranaceous, entire leaves; the flowers are in terminal or axillary cymes. They are mostly natives of the northern hemisphere, and especially of North

America; they abound in a lactescent fluid, which, when dried, has the properties of caoutchouc.

1. A. ANDROSÆMIFOLIUM, *Linn.*—Leaves ovate-acute, above glabrous, beneath very slightly pilose; cymes lateral and terminal, smooth; tube of the corolla longer than the calyx.

Linn., *Sp. Pl.* 311; Bigelow, *Med. Bot.*, ii. 148; Rafinesque, *Med. Fl.*, i. 49; Zollickoffer, *Am. Jour. Med. Sci.*, xii. 378.

Common Names.—Dog's-bane; Bitter-root; Milk-weed.

Description.—Root perennial, large and bitter. Stem smooth, three to five feet high, lactescent, with a tough fibrous bark. The leaves are opposite, petiolate, ovate, entire, perfectly smooth above, and very slightly pilose beneath. Flowers in cymose racemes, longer than the leaves, nodding, few-flowered, with minute bracts on the peduncles. The calyx is small, five-cleft. The corolla is flesh-coloured, campanulate, and divided into five spreading, acute segments. The stamens are five, with short filaments, and long, sagittate, connivent anthers; there are five glandular appendages, alternating with the stamens. The ovaries are two, ovate, and supporting two sessile stigmas. The fruit is in the form of a pair of slender, acute, drooping follicles, containing numerous oblong, imbricated seeds, attached to a central torus, and furnished with a long, downy, pappus.

Fig. 200.

A. androsæmifolium.

It is found in some plenty in most parts of the United States, growing in dry, sandy soil, on hill-sides or in woods; flowering in June and July. The part that is officinal is the root, which is large, lactescent, and of a disagreeably bitter taste; the active portion is the cortical, which forms nearly two-thirds of it. It has never been fully examined, but from some experiments by Dr. Bigelow, it appears to contain a Bitter extractive principle, a Colouring matter, soluble in water but not in alcohol, Caoutchouc, and Volatile oil. It yields its properties to water and alcohol. Dr. Zollickoffer obtained 178 grains of alcoholic and 28 grainsof watery extract from 3240 grains of the cortical part of the root, and inversely 160 of watery and 104 of alcoholic. (*Am. Jour. Med. Sci.*)

Medical Properties.—This root is emetic and diaphoretic. In full doses, it promptly induces emesis, causing scarcely any previous nausea, and hence is well calculated for those cases where it is wished to evacuate the contents of the stomach, without producing that relaxation of the muscular system, incident to a long-continued nausea. As a diaphoretic, it is much inferior to several others of the vegetable emetics, as it requires large doses in combina-

tion with opium to produce this effect. Like Ipecacuanha, when given in small doses, it gently stimulates the digestive apparatus, and thus effects a corresponding impression on the general system.

Dose as an emetic, forty grains; as a diaphoretic, the same quantity with one grain of opium; as a tonic or alterant, from ten to twenty grains.

2. A. CANNABINUM, *Linn.*—Stem upright, herbaceous. Leaves oblong, tomentose beneath; cymes lateral, longer than the leaves.

Linn., *Sp. Pl.* 311; Torrey, *Compend.*, 124; Griscom, *Am. Jour. Med. Sci.*, xii. 55.

Common Names.—Indian Hemp; Dog's-bane, &c.

Fig. 201.

A. cannabinum.

Description.—Root perennial, creeping. Stems brown, from two to three feet high, with oblong, ovate, somewhat pubescent leaves. The cymes are many-flowered, paniculate, smooth. Calyx with subulate segments, about as long as the corolla. Corolla small, campanulate, of a greenish or yellowish-white externally, with a tinge of pinkish within. Follicles long and slender.

This species is found in most parts of the United States, growing in waste lands and neglected situations. It flowers from July to September. There are two marked varieties, which some botanists have considered to be distinct species, one with almost smooth leaves, the other with the under surface of these organs and the cymes pubescent. The officinal portion is the root. This is of a reddish-brown colour when young, and of a dark-chestnut when old; on being wounded, it pours out a milky juice. In the fresh state, it has a nauseous, somewhat acrid, and permanently bitter taste, and a strong and unpleasant odour. When dried, it is brittle and readily pulverized, affording a powder resembling that of Ipecacuanha. The ligneous portion is yellowish-white, with some odour and a decided bitter taste. The cortical part is brown externally, and white within, of a very bitter, nauseous taste. According to Drs. Knapp and Griscom, who each analyzed it, it contains Tannin, Gallic acid, Gum, Resin, Wax, Fecula, Colouring matter, a Bitter principle, for which they both propose the name of *Apocynin*, &c.

Medical Properties.—Indian hemp is an emeto-cathartic, diuretic and diaphoretic. Its first operation, in a full dose, is to cause much nausea, diminishing the frequency of the pulse, and occasioning a tendency to sleep, independent of the exhaustion usually consequent on vomiting; this latter soon ensues, and is copious, followed by large and feculent watery alvine evacuations. A general perspiration almost invariably succeeds. Its diure-

tic properties are not so generally displayed, being very manifest in some cases, but not so marked in others. It also acts as a sternutatory, exciting much irritation of the nasal membrane. The fresh juice has likewise been employed as an external application in some cutaneous affections.

The disease in which it has been found most useful is dropsy; in this, from the concurrent testimony of several eminent practitioners, its remedial powers are decided, sometimes operating as a hydragogue purgative, and at others causing the most profuse discharges of urine, and thus relieving the tissues from their morbid burden. Dr. Knapp gives the details of some cases of intermittent fever and pneumonic affections, in which he derived much benefit from this remedy, employed as a diaphoretic. (*Am. Med. Rev. & Jour.*)

When given as an emetic, the powder is to be preferred, in doses of fifteen to thirty grains; where its hydragogue or diuretic effects are desired, the best form is in decoction, made by boiling an ounce of the root in a pint of water; the dose is about a wineglassful, two or three times a day. The watery extract will act on the bowels in doses of from three to five grains, but is not as efficient as the decoction. (*Amer. Jour. Med. Sci.* 1836.)

Besides the value of this plant as a therapeutic agent, it is entitled to notice for its use in the arts. The bark furnishes a fibre resembling hemp, but of a whiter colour, and superior in strength and durability; and a decoction of the plant affords a permanent brown or black dye, according to the mordant used.

NERIUM.—*Linn.*

Calyx 5-cleft. Lobes lanceolate, base within multiglandular. Corolla 5-cleft, throat of tube crowned with 5 appendages. Lobes obovate; æstivation sinistro-convolute. Stamens inserted on the middle of the tube. Filaments ligulate. Anthers longer than the filaments, bicaudate at base, and adhering to the stigma. Ovaries 2; style filiform, dilated at tip with a membranous indusium; stigma short, with 5 glands at base. Follicles long, straight. Seeds numerous, oblong, pubescent, with a large coma; albumen copious.

This small genus of ornamental shrubs is principally confined to Asia; but one species is found in the south of Europe, and is generally cultivated under the name of Oleander.

N. OLEANDER, *Linn.*—Leaves opposite or ternate, lanceolate, acute; appendages of corolla 3—4-toothed.

Linn., *Sp. Pl.* 305; Lamarck, *Illust.* t. 174; De Candolle, *Prod.* viii. 420.

Common Name.—Oleander.

Foreign Names.—Laurier Rose, *Fr.*; Alloro Indiano, *It.*

The Oleander is originally a native of Asia, but is now naturalized in the south of Europe, where it grows in fissures of rocks by the sides of streams. It differs from the other plants of the order in having a transparent, and not a milky juice, which is stated by Gray (*Supp. Pharm.* 65) to clear muddy water. It is probably the Rhododendron of Pliny, who says that although its leaves are a poison to all quadrupeds, that they are a counterpoison to the venom of serpents (lib. xxiv. c. xi.) This plant is an active poison, and is used at Nice to destroy rats. The leaves have been analyzed (*Bull. de Pharm.*), but the results are far from satisfactory.

Fig. 202.

N. oleander.

Medical Uses, &c.—An ointment made by boiling the leaves in oil or lard, is in much repute in the south of France in cutaneous eruptions, and to

destroy vermin infesting the hair or skin. Merat and De Lens state that they have used a solution of an extract from the leaves in the treatment of itch with much success (*Dict.* iv. 599). Dr. Deslongchamps has administered the bark internally in small doses in lepra and syphilitic eruptions with benefit, but states that its use demands great caution, as an overdose will cause the most unpleasant symptoms (*Dict. Sci. Med.* xxvii. 338). Dr. Tarbes of Montpelier records two cases in which the leaves were given in intermittent fever, and caused the death of the patients. The powder of the leaves has also been used as a sternutatory; it acts slowly but violently (Ferrein, *Mat. Med.* i. 242).

According to Orfila (*Toxicol.* ii. 301), this plant is an active acro-narcotic, and the experiments of Dr. Grognier show that the wild plant is much more potent than the cultivated. Even the wood is highly deleterious. In 1809, when the French troops were near Madrid, some of the soldiers used branches of the Oleander, deprived of their bark, as spits on which to roast their meat; this caused the death of twelve of them (*Lindley*, 600). M. Robert, director of the botanic garden at Toulon, mentions a similar circumstance that took place in Corsica.

The *N. odorum*, of India, has much the same qualities. Ainslie (*Mat. Ind.* ii. 23), says it is considered as a powerful repellent applied externally, and that the root taken internally is poisonous, and is resorted to by the Hindoo women for the purpose of self-destruction. The flowers, which are odorous, are said to have caused dangerous symptoms in persons who slept with them in their chambers (Richard, *Elem. Hist. Mat.* ii. 143).

Order 72.—ASCLEPIADACEÆ.—*Lindley.*

Calyx 5-cleft, persistent. Corolla monopetalous, hypogynous, 5-lobed, regular; æstivation usually imbricated, seldom valvular. Stamens 5, inserted on the base of the corolla, alternate with the segments. Filaments commonly connate. Anthers 2-celled, sometimes almost 4-celled, from the dissepiments being nearly complete. Pollen cohering in masses, or in pairs, and adhering to the five lobes of the stigma. Ovaries 2. Styles 2, often short, closely approximating. Stigma common to both styles, 5-angled, with corpusculiferous corners. Follicles 2, one often abortive. Placenta attached to the sutures, but afterwards separating. Seeds numerous, imbricated, pendulous, almost always with a coma. Embryo straight. Albumen thin.

This extensive order is composed of shrubs and herbs, in most cases abounding in a milky juice, sometimes twining, with entire, opposite, sometimes alternate or verticillate leaves, having ciliæ between the petioles instead of stipules. The greatest number of them are natives of South Africa, but they also abound in all tropical climates. A few of the genera only are found in extra-tropical regions.

The plants, but more especially their roots, are acrid and stimulating, and operate as emetics, purgatives, and diaphoretics. *Periploca græca*, a native of Europe, and cultivated in the United States, furnishes a very acrid juice, which is used in Greece as a wolf-poison, and the leaves to dress ulcers. Various species of *Secamone* are used; thus *S. emetica* has vomitive roots, and those of *S. thunbergii* are said to be actively purgative. In *Tylophora asthmatica* the root is emetic, and is used in India as a substitute for ipecacuanha; Roxburgh speaks of it highly; and Dr. Anderson, of Madras, states that it was employed very beneficially in dysentery; in large doses it is emetic, and in small ones frequently repeated, it purges; Burnett also says that it is efficacious as a diaphoretic in humoral asthma (*Lindley*, 626). Several native species of *Gonolobus* afford a very acrid juice, which it is said was used by

the aborigines to poison their arrows; taken internally, in small doses, it operates as a drastic purge. The *Vincetoxicum officinale* was at one time much used in Europe as a hydragogue, and thought beneficial in cutaneous eruptions and scrofula. The roots of *Sarcostemma glauca* are employed in Venezuela as a substitute for ipecacuanha. Those of *Gymnema sylvestre* are supposed in India to possess virtues in snake-bites; they are used both externally and internally (*Ainslie*, ii. 340).

The leaves of *Solenostemma argel*, as before observed, are used in Egypt to mix with senna, and sometimes form a large proportion in some samples of the Alexandrian; it is stated that the leaves of *Gomphocarpus fruticosus* are employed for the same purpose. The young stalks of *Hoyea viridiflora* are said in India to possess virtues in dropsical cases, and also as an expectorant. In short, almost all the plants of this order have much the same properties to a greater or less extent. Some of them, it is said, are so mild as to be used as food; but, as a general rule, they are deleterious; a few of the species yield caoutchouc, and many of them afford a very tenacious fibre, that may be employed for all the purposes of hemp; that of *Asclepias syriaca* has been manufactured into ropes, and found fully equal to the best Russian. Royle states that from some species a very good indigo can be made, particularly from *Marsdenia tinctoria* (*Illus.* 274).

Hemidesmus.—*R. Brown.*

Calyx 5-parted. Corolla rotate, with coriaceous segments, and five rounded, thick scales in the throat of the tube. Filaments connate at base, inserted in the tube, above distinct. Anthers free from stigma, cohering at tip, smooth. Pollen masses 20, granular, having a quaternary arrangement. Stigma pentagonal, stellate. Follicles cylindrical, smooth.

A small East Indian genus, including a few species formerly arranged in *Periploca*, and consisting of twining plants, with opposite or somewhat irregular leaves, and flowers in interpetiolary cymes.

H. indicus, *Brown.*—Smooth, leaves ovate, subcordate or oblong, with the ends obtuse, or linear and cuspidate. Cymes subsessile. Peduncles bracteolate. Scales of corolla obtuse, adhering to whole length of tube. Follicles slender, erect.

Common Names.—Country Sarsaparilla; Indian Sarsaparilla.

It is a native of Lower India and Ceylon, and other parts of the East Indies. It was first described by Bergius (*Zeylan.*, 187), as a species of *Periploca*, and was considered as such until made the type of the present genus by Brown. It has been in use as a medicinal agent in India for a long time, but was almost unknown in Europe until the attention of the profession was called to it in 1819, by Dr. Ashburner (*Lond. Med. and Phys. Jour.*) The root is the part used; this is brownish externally, and is long, tortuous, round, rugose, and furrowed longitudinally. The cortical portion has a cork-like consistence, and the ligneous portion is yellowish. The odour is peculiar and somewhat aromatic, resembling that of orris root, and the taste bitterish. It has been analyzed by Mr. Garden (*Lond. Med. Gaz.*), who found in it a peculiar Volatile, crystallizable substance, on which the properties of the root depended; he, from supposing the root to be that of a *Smilax*, called it *Smilasperic acid.*

Medical Properties.—The properties of the Hemidesmus are much the same as those of sarsaparilla, for which it has been employed as a substitute. Ainslie (*Mat. Ind.* i. 382) states that it is "recommended by the Tamool doctors in cases of gravel, given in powder, mixed with cow's milk; they also give it in decoction, in conjunction with cummin seeds, to purify the blood and correct the acrimony of the bile." Dr. Ashburner, who employed it in many cases, speaks in the highest terms of it as an alterative; he says it in-

creases the appetite, acts as a diuretic, and improves the general health. It has also been administered with advantage in venereal complaints, and in fact in all those disordered conditions of the system in which sarsaparilla has been found beneficial. It is given in infusion, decoction, or extract, both of which forms are objectionable, as the volatile active principle is partly driven off. The syrup has been found advantageous, the best method of making which has been given by Mr. Bell, in the *Lond. Pharm. Journ.* (*Am. Journ. Pharm.*, ix. 298.)

Asclepias.—*Linn.*

Calyx 5-parted. Segments small, ovate, spreading. Corolla deeply 5-cleft, mostly reflected. Stamineal crown 5-leaved, leaflets cucullate, opposite the anthers, with a subulate everted process at base. Pollen masses compressed, attached by a narrow apex, and pendulous. Stigma depressed, mutic. Follicles ventricose, acuminate, smooth or muricate. Seeds comose.

A genus of about fifty species, principally of North American herbaceous perennials, with opposite, verticillate, rarely alternate leaves. All the species afford a silky flax, and most generally abound in a lactescent juice.

A. TUBEROSA, *Linn.*—Stem erect, hairy, with spreading branches. Leaves oblong, lanceolate, sessile. Umbels numerous, terminal.

Linn., *Sp. Pl.*, 316; Bigelow, *Am. Med. Bot.*, ii. 59; Barton, *Veg. Mat. Med.*, i. 239; Rafinesque, *Med. Fl.*, i. 74; Lindley, *Med. Flor.* 529.

Common Names.—Butterfly Weed; Pleurisy Root; Wind Root, &c.

Fig. 203.

A. tuberosa.

Description.—Root perennial, large, fleshy, white. Stems many, either erect, or more or less procumbent, round, hairy, green or red. Leaves scattered, sessile, entire or undulated, oblong or lanceolate, sometimes nearly linear, very hairy, dark-green above, paler beneath. The flowers are in terminal, rarely lateral, corymbose umbels, with an involucre of numerous, linear, subulate bracts. The calyx is small, 5-parted, reflexed. The corolla is of a bright orange colour, 5-parted, reflexed. The stamineal crown has five erect, cucullate segments or leaves, with an incurved appendage or horn at the base of each. The follicles are two, often one or both abortive, long, narrow, and acuminated. The seeds are furnished with a long silky appendage.

This species is found in most parts of the United States, but is most abundant to the South, growing in open situations, in gravelly and sandy soils. It flowers

in July and August, and may readily be distinguished by its bright orange flowers, which, contrasting with its dark-green leaves, give it a very ornamental appearance. The root is the officinal part; this when fresh has an unpleasant, subacrid taste. When dried it is brittle and readily pulverised, and is bitter but not nauseous. It yields its properties to boiling water. No analysis has been made of it, but it is known to contain a bitter extractive, fecula, &c.

Medical Properties.—This root is diaphoretic and expectorant, and also acts as a mild tonic. It is valuable, as it does not appear to exercise any stimulating powers. Schoepf was the first to notice its medical properties. He says that it is diaphoretic, and somewhat astringent, and adds in another place, that it was found a certain remedy in pleurisy. Dr. B. S. Barton was the next writer that noticed it, he states (*Collections*): "It is said to possess a remarkable power of affecting the skin, inducing general and plentiful perspiration, without greatly increasing the heat of the body," and also, that "it is much employed by practitioners of medicine in some parts of the United States, particularly, I believe, in Virginia, as a remedy in certain forms of fever, in pleurisy, and other affections." He esteemed it as one of the most important of our indigenous medicines.

It has since been a popular remedy in a variety of diseases, and has been employed with much benefit in those of the respiratory organs, and there is most ample testimony of its curative powers when judiciously administered. Dr. Chapman (*Elem. Therap.* i. 351), states that it is distinguished by great certainty and permanency of operation, and is well suited to excite perspiration in the forming stages of most of the inflammatory diseases of winter; and is not less useful in the same cases at a more advanced period, after the reduction of action by antiphlogistic remedies.

It has also been advantageously employed in acute rheumatism, and in the low state of typhus fever, when other diaphoretics were insufficient or contra-indicated. Some evidence has likewise been adduced of its power in bowel affections. Dr. Eberle found it useful in dysentery (*Prac. Med.* i. 216), and Dr. Parker of Massachusetts, who employed it for twenty-five years, had the greatest confidence in its powers. (Bigelow, *Am. Med. Bot.* ii. 26.) It is also said to be gently tonic, and has been popularly used in indigestion accompanied with flatulence and pain, whence one of its common names, *wind root.* From all that can be gathered on the subject, it may be deemed one of the most useful of our native articles, and deserves a full and unbiassed trial.

It is administered either in powder, in doses of twenty grains to a drachm several times a day, or preferably in infusion or decoction, made with an ounce to a quart of water, of which a teacupful is to be taken every two or three hours, until the desired effect is produced.

Two other native species, *A. Syriaca*, (*Cornuti*, D. C.,) and *A. incarnata*, are also recognised in the Pharmacopœia; they are said to possess analogous properties with the *A. tuberosa*, and to have been successfully used in asthmatic, catarrhal, and rheumatic affections. Dr. Richardson of Medway employed the first in these complaints, to the amount of a drachm a day, but in divided doses, with the best results. In all instances, it acted as an anodyne, relieving pain and inducing sleep (Coxe, *Am. Dispen.*) Dr. Tully, whose experience with our native remedies has been greater than that of any other practitioner, states that the *A. incarnata* may be advantageously given in catarrh, asthma, syphilis, &c. (Bigelow, *Med. Bot.*)

Some other species have also been resorted to, as emetics, sudorifics, and antispasmodics; in fact, the whole genus appears to be endowed with much the same properties.

Calotropis.—*Brown.*

Calyx 5-parted. Corolla subcampanulate, tube angular, limb deeply 5-cleft. Stamineal crown 5-leaved, lobes linear-oblong, sub-compressed, keel-like, vertically adnate to the gynæcium; below free, recurved, and involute. Pollen masses sickle-shaped, compressed, transverse, connected by their slender apex. Stigma five-angled, depressed. Follicles ventricose, smooth, base and apex umbilicate. Seeds comose.

A small genus, formed from some species of *Asclepias*, consisting of shrubby African, and Asiatic plants, with a corky bark, broad leaves, glandular petioles, and large, handsome flowers.

C. gigantea, *Brown.*—Leaves opposite, nearly sessile, acute, entire, somewhat cordate at base. Segments of corolla spreading, or reflexed.

Brown, *Tr. Wern. Soc.* i. 29; Hamilton, *Tr. Linn. Soc.* xiv. 248; Ainslie, *Mat. Ind.* i. 486.

Common Names.—Mudar; Madar, &c.

The Mudar, as this plant is called, is a native of various parts of the East Indies, and is naturalized in the West Indies; it is noticed by Browne as common in Jamaica, where it is known as the *French Jasmin.* I have also met with it in abundance in St. Croix. The part used in medicine is the root; this is fusiform, branched, of a pale fawn-colour externally, covered with a brownish powder, which adheres to the fingers, and wrinkled longitudinally; within it is whitish; it has little or no odour, but a bitter, and somewhat nauseous taste. It is prepared by digging up the roots in the spring, washing them, and drying them in the open air until the milky juice is inspissated; the epidermis is then scraped off, and the cortical portion kept for use in well-closed bottles. The powder is pale fawn-colour. It has been analyzed by Cassanova, and found to contain an Extractive substance (*Madarine*), soluble both in alcohol and water, an almost insoluble Resin, Gum, Starch, Albumen, and a little Fixed oil, &c.

Medical Properties.—It is purgative, alterative, and diaphoretic, and is spoken of by a number of eminent practitioners as eminently successful in the obstinate cutaneous affections so common in tropical climates. Robinson praises it highly in elephantiasis and lepra (*Med. Chir. Trans.* x. 31); and Playfair states, that he has found it of the greatest utility in lepra, hectic fever, rheumatism, &c. (*Trans. Med. and Phys. Soc. Calcutta*, i. 77). He gave it in doses of grs. iij.—xij., three times a day. Cassanova, who experimented largely with it, confirms these statements; he says that its action is more particularly directed to the skin, increasing the action of the capillaries and absorbents of that tissue (*Essai sur le Madar*). When combined with opium it acts as a diaphoretic, and in small doses is expectorant and tonic, whilst in large ones it causes emesis. Dr. Duncan, who made many trials of it, states that he is satisfied that in every respect its action is so similar to that of ipecacuanha that it may always be substituted for it. He was not successful with it in elephantiasis, but found it beneficial in psoriasis and lepra (*Edin. Med. and Surg. Jour.* xxxii. 62).

Dr. A. T. Thomson is of opinion that in some of its alterative effects it resembles mercury, and that it is most useful in low conditions of the system, and also, that during its administration, the diet should be mild and vegetable (*Elem. Mat. Med.* ii. 492). Ainslie, from his own observations in India, prefers the dried, milky juice to the root, and if the principle described by Duncan and Cassanova be the active ingredient, this opinion is probably correct. The dose of the powder is from three grains to thirty, in which latter quantity

it is emetic, in the smaller, alterative and expectorant. It is also given in infusion, made with three drachms of the root to eight ounces of boiling water; this is emetic in doses of two ounces.

Although it is generally conceded that the Madar is furnished by the species under consideration, it is also certain that the roots of a number of the Asclepiadaceæ are known under this name in India, and all possess analogous properties; these are very similar to those of our native *Apocynums*, heretofore noticed.

Cynanchum.—*Linn.*

Calyx 5-parted, segments ovate. Corolla rotate, deeply 5-cleft, segments linear-oblong, or ovate, obtuse. Stamineal crown monophyllous, 10-lobed; anthers membranous at apex; pollen in round masses, pendulous. Stigma pentagonal, with twin tubercles. Follicles oblong, smooth, usually one by abortion. Seeds with a coma.

This genus, as now restricted, contains but few species, which are mostly sarmentose or climbing plants, with cordate leaves. The flowers are in small, axillary umbels. They are found in various parts of the world, and all contain an active, milky juice.

C. acutum, *Linn.*—Stem twining; leaves oblong-ovate, cordate, smooth; peduncles shorter than the leaves; follicles oblong, acuminate, smooth.

Linn., *Sp. Pl.* 310; Richard, *Elem. Hist. Mat. Med.* ii. 138; De Candolle, *Prod.* viii. 547; Jacquin, *Miss.* i. f. 4.

It is a native of the countries bordering on the Mediterranean, where its juice, in an inspissated state, is used as a drastic purgative, under the name of Montpelier scammony. This is black, hard, compact, and when moistened, becomes dark-gray, unctuous and viscid. It has a faint but disagreeable smell, and a nauseous taste. It acts violently on the bowels, and causes much pain. It is now seldom employed in practice, but is said to be used to adulterate the Aleppo scammony.

Some other species of Cynanchum (*Linn.*), are in use in different countries. *C.* (*Dimia*) *extensum*, a native of India, is employed in that country as an anthelmintic, for which purpose a decoction of the leaves is preferred; the juice is ordered in asthma. The root of *C.* (*Marsdenia*) *erectum* is eminently poisonous, and is said to have been formerly in use in Syria as a means of self-destruction, or murder. The leaves of *C.* (*Solenostoma*) *argel* are very purgative, and are used largely to adulterate Alexandrian Senna; and it is probable that some of the griping and unpleasant effects of this purgative are, in a great measure, owing to the presence of Argel. Besides the leaves, which may be known from those of Senna by being more coriaceous, and wrinkled and equilateral, the flowers and fruit are also found in some parcels in abundance.

Fig. 204.

C. argel.

Order 73.—GENTIANACEÆ.—*Lindley.*

Calyx of usually 4—5 persistent, more or less united sepals. Corolla usually regular and persistent, divisions equal in number to those of the calyx, mostly twisted in æstivation. Stamens inserted on the tube of corolla, alternate with the segments, and equal in

number to them. Ovary 1-celled, styles united or none; stigmas 2. Capsule many-seeded, with 1 or 2 cells, usually 2-valved. Seeds small, with a fleshy albumen, and a minute embryo.

A somewhat extensive order, consisting of herbs with a watery juice, and in almost all cases, opposite and entire leaves. The flowers are generally handsome. The species are found in all parts of the world, from the frigid zones to the tropics. They all are pervaded by a bitter principle, which is most developed in the roots in some genera, and in the leaves and stalk in others. From this identity of properties, except that in some, especially in a fresh state, a slight narcotic power exists, they may be employed indifferently.

SABBATIA.—*Adanson.*

Calyx 5—12-parted, rarely 5-cleft, segments acute. Corolla rotate, regular, 5—12-parted. Stamens 5—12, inserted in the throat of the tube; anthers erect, spirally twisted after shedding the pollen. Ovary superior, ovate; style distinct, declining, bifid; stigmas capitate, ascending. Capsule bivalve, septicidal, somewhat 2-celled, valves inflexed. Seeds numerous, small.

This small genus of North American plants consists of biennial species; mostly with rose-coloured flowers of much beauty, and possessed of very bitter properties. It was established by Adanson, and named in honour of a Roman botanist, but was united to *Chironia* by Linnæus, to which, in fact, it is closely allied, but has again been separated under its former name by more modern botanists. All the species are bitter and tonic, but only one is officinal.

S. ANGULARIS, *Pursh.*—Stem erect, angular, and winged; leaves amplexicaul, ovate, acute; segments of the calyx lanceolate, shorter than the corolla; stamens five.

Fig. 205.

S. angularis.

Linn., (*Chironia,*) 272; Pursh, i. 137; Barton, *Veg. Mat. Med.* i. 255; Bigelow, *Am. Med. Bot.* iii. 147; Rafinesque, *Med. Flor.* ii. 76; D. B. Smith, *Jour. Phil. Coll. Pharm.* ii. 213; Lindley, *Flor. Med.* 522.

Common Names.—Centaury; American Centaury; Rose Pink.

Description. — Root annual? or biennial, fibrous, yellow. Stem one to two feet high, with opposite branches, forming a corymb, smooth, angular, with membranous wings at the angles. Leaves opposite, sessile, subcordate and clasping, smooth, very entire. Flowers terminal, numerous, of a rich rose colour, nearly white in the centre. Calyx of five narrow, lanceolate, almost subulate segments, about half the length of the corolla. Corolla with five obovate segments. Stamens five, erect, with short slender filaments, and oblong anthers of a yellow colour, which are spirally twisted after fecundation. Ovary ovate, with a terete style, bifid, and the stigmas twisted together. Capsule many-seeded.

Very common in low meadow grounds or neglected fields in most parts of the United States; flowering in August and September. The whole plant is very bitter, and is officinal, and yields its virtues to alcohol and water, and also affords an efficient extract. It is to be preferred to the

European Centaury, as the flowers as well as the leaves are active. It has long been known and employed as a domestic remedy, and is also generally admitted in regular practice where a pure and simple bitter is required.

Medical Properties.—A pure bitter and tonic, with no astringency and very little aroma. It is much used as a stomachic, and has been found beneficial in intermittents, especially if the intervals between the paroxysms are sufficient to require tonics, but not such as would warrant the employment of Quinia. It is also said to act as an emmenagogue and vermifuge when given in warm infusion. The usual mode of administration is in cold infusion, made with an ounce of the herb to a pint of boiling water, and allowed to cool; the dose is a wineglassful every two hours. The dose of the powder is from thirty grains to a drachm. (Chapman, *Therap.* ii. 425.)

Erythræa.—*Persoon.*

Calyx 5-parted, equal. Corolla infundibuliform, with a cylindrical tube, marcescent. Stamens 5; anthers becoming spiral. Stigmas bi-lamellate. Capsule one-celled, or half two-celled.

This genus also formed part of *Chironia* of Linnæus, and is closely allied to the foregoing. It consists of annual herbs, with subangular branches, furnished with connate leaves, and white or rose-coloured flowers. They are all bitter and tonic.

E. centaurium, *Persoon.*—Stem nearly simple. Panicle forked, corymbose. Leaves ovate-lanceolate. Calyx half as long as corolla, segments partly connected by a membrane.

Linn., (*Chironia,*) *Sp. Pl.* 332; Woodville, t. 157; Stephenson and Churchill, ii. 118; Persoon, *Synop.* i. 283; Lindley, *Flor. Med.* 521.

Common Names.—Common Centaury; Lesser Centaury.

Foreign Names.—Petite Centaurée, *Fr.;* Centaurea Minore, *It.;* Tausendgüldenkraut, *Ger.*

Description.—Root small, woody, and fibrous. Stem slender, erect, angular, about ten or twelve inches high, branched above. The cauline leaves are opposite, connate, ovate, or elliptic-ovate; the radical leaves are numerous and obovate, forming a tuft. The flowers are pink or rose-coloured, with opposite subulate bracts. The calyx is slender, striated, and five-cleft. The corolla is divided above into five elliptical spreading segments. The stamens are five, with slender filaments, and oblong, yellow anthers, which finally become spirally twisted. The ovary is oblong, and supports a straight style, with a roundish bifid stigma. The capsule is oblong and cylindrical, two-valved, with numerous seeds.

It is a native of Europe, in dry gravelly situations, flowering in July and August. Its specific name is from Chiron the Centaur, but is not the plant noticed by Pliny as curing him of a poisoned wound; this is supposed to be a *Centaurea.* The officinal portion is the tops, though the whole plant is used. It is bitter, and contains a Bitter extractive, a free Acid, &c. The bitter matter is considered peculiar, and has been called *Centaurin.*

Medical Properties.—Similar to those of the Sabbatia, and appropriate to the same cases.

Another species, the *E. chilensis,* a native of Chili and Peru, has been highly spoken of by many writers, as of very decided tonic powers (Lesson, *Voy. Med.* 15), and was employed with much success by Dr. Ruschenberger, in all cases where mild tonics were indicated. (*Jour. Phil. Coll. Pharm.* vi. 276.) The *E. linarifolia* of Europe is also much praised by Alibert.

Gentiana.—*Linn.*

Calyx 4—5-parted or cleft. Corolla marcescent, funnel-shaped, or campanulate, 4—5 or 6—8-cleft, sometimes with interposed spurious segments; segments entire or ciliated. Stamens five, inserted on the tube of the corolla; anthers sometimes connate. Style two-parted, each bearing a stigma. Capsule one-celled.

An extensive genus, containing about 150 species, according to Grisebach, divided into numerous sections, but all plants mostly perennial, with opposite leaves, though varying much in habit. They are found in all parts of the world, but are most numerous in temperate and cold regious. Their general properties are those of the pure and simple bitters. Several of them are officinal.

G. lutea, *Linn.*—Leaves broad, ovate. Flowers whorled, yellow. Calyx membranaceous, unilateral.

Linn. *Sp. Pl.* 329; Woodville, ii. 273; Stephenson and Churchill, iii. 132; Lindley, *Flor. Med.* 519.

Common Names.—Common Gentian; Yellow Gentian; Gall wort.

Foreign Names.—Grande Gentiane, *Fr.;* Gentiana gialla, *It.;* Bitterwurzel, *Ger.*

Description.—Root perennial, long, roundish, with numerous thick, contorted branches, of a brown colour externally, and yellowish within. The stem is simple, erect, hollow, roundish, somewhat annulated at base, from three to four feet high. The lower leaves are petiolate, large, spear-shaped, entire, ribbed, and plaited; the cauline are ovate, concave, smooth, sessile, and of a yellowish-green colour, pedunculate, in dense whorls. The calyx is membranaceous, and opens laterally. The corolla is rotate, and divided into five or more long, narrow, spreading segments. The filaments vary from five to eight, are shorter than the corolla, and alternate with its segments, furnished with long, erect, anthers. The ovary is conical, supporting two sessile, reflected stigmas. The capsule is conical, divided into two valves, and contains numerous, small, compressed seeds, with membranous edges.

Fig. 206.

G. lutea.

It is a native of the mountains of Europe, but thrives well under cultivation. It is said to owe its name to Gentius, a king of Illyria, and is first mentioned by Dioscorides, and also noticed by Pliny. The officinal part is the root; this, as found in commerce, is in cylindrical, more or less branched pieces, of various sizes, marked with annular wrinkles, and longitudinal furrows. The exterior is yellowish-brown, internally spongy, and of a deep yellow. The odour in the fresh state is peculiar and disagreeable, when dried very feeble; the taste is very bitter. The roots of other species, as the *G. purpurea*, *punctata*, and *pannonica*, are said to be often mixed with the officinal, but as they possess much the same properties, this is of little con

sequence; but it is also stated that those of the *Ranunculus thora* are likewise mingled with them; this fraud is of some moment, as the qualities of the roots are widely different. The spurious root may be known by being paler externally and whitish within, and having a mucilaginous, acrid taste. Gentian yields its virtues both to alcohol and water.

It has often been analyzed, and the discovery of a peculiar principle was announced about the same time by Henry and Caventou; but more recently Tromsdorff asserts that two distinct substances have been confounded under the name of *gentianin;* one crystalline and tasteless, the other bitter; and Leconte states the same. From the various examinations, the root appears to contain a peculiar Oil, Gentisin, or Gentsicic Acid, Gentianite or the bitter principle, Pectin, Sugar, &c.

Fig. 207.

G. catesbæi.

Medical Properties.—Gentian is a pure or simple bitter, and is applicable to all cases where such medication is required. It at one time occupied a high place as a febrifuge in intermittent fevers, but has been superseded by the Peruvian bark and its preparations. In large doses it is sometimes aperient, but in small ones is beneficial in certain forms of dyspepsia, chlorosis, &c., either alone, or in combination with chalybeates or the alkalies. It is usually given in infusion with orange and lemon-peel; the dose is an ounce to two ounces. The tincture is also used as a tonic and stomachic, in doses of a half to two drachms.

Many other foreign species are employed as substitutes for the yellow Gentian; besides those mentioned above, the *G. amarella*, the *campestris*, and *pneumonanthe* are used in Europe. In this country several indigenous kinds are much given in domestic practice, and appear to be fully equal to the foreign. Among these the *G. saponaria*, *catesbœi*, and *quinqueflora* are the best known and most esteemed. In a fresh state they all prove cathartic in large doses. They are seldom employed in regular practice, from the foreign root being readily procurable, but may always be used as a substitute for it.

Ophelia.—*Don.*

Calyx 4—5-parted. Corolla marcescent, rotate, 4—5-parted; in æstivation twisted to the right, with glandular hollows, either protected by a fringed scale or naked. Stamens

4—5, inserted on the throat of the corolla. Filaments either dilated and monadelphous at base or free. Anthers incumbent. Ovary 1-celled. Style wanting or very short. Stigmas two, sessile. Capsule 1-celled, 2-valved, septicidal, with a spongy placenta at the sutures. Seeds small, very numerous.

A small genus formed by Don (*Phil. Mag.*) for the reception of certain species of *Gentiana* and *Swertia*, and as now recognised by De Candolle, including also *Agathotes* of Don. The species are all East Indian, and are mostly annual, rarely perennial, erect, branched, paniculate, with subequal internodes, and opposite leaves. They possess the same general properties as the Gentians.

O. CHIRAYTA, *Grisebach.*—Stem round. Leaves ovate-lanceolate. Hollows of the corolla nectariferous, oblong, distinct. Scales capillo-fimbricate at the margin.

Grisebach, *Gent.* 320; Roxburgh (*Gentiana*), *Asiat. Research.*, xi. 167; Don (*Agathotes*), *Phil. Mag.* 1836.

Common Names.—Chirayta; Chiretta; Wormseed Plant.

Foreign Names.—Chirāeta, *Hind.*; Kirātaticta, *Sansc.*

Description.—Annual root branching. Stem terete, smooth, jointed, branched. Branches long, erect, spreading. Leaves cordate-ovate, acuminate, sessile, smooth, 5 to 7-nerved. Flowers numerous, in cymose, few-flowered umbels. Calyx 4-cleft; segments shorter than the corolla, linear, acute. Corolla yellow, 4-parted; segments spreading, ovate-lanceolate, acuminate, with two oblong, distinct hollows, with fimbriated scales. Stamens 4, with subulate filaments, briefly connected at base. Capsule conical, 1-celled, many-seeded.

This plant is a native of the upper part of India, in Nepaul, &c., and is much used and esteemed in that country as a tonic. Roxburgh (*Flor. Ind.*) states that it is pulled up by the root, when the flowers fade and the capsules are filled. The whole plant is used. The root is fibrous, the stem round, smooth, and jointed; the odour is very feeble, but the taste exceedingly bitter. According to an analysis by Lassaigne and Boissel it contains Resin, a yellow Bitter Extractive, brown Colouring matter, Malic Acid, Gum, some Salts, &c. It yields its virtues to water and alcohol. This is the plant supposed by Guibourt to be *Calamus verus* of the ancient writers; but, as shown by Fée, this supposition is wholly untenable.

Medical Properties.—Like Gentian it is a pure and simple bitter, and is applicable to the same morbid conditions. It is much employed in India in intermittents and in dyspepsia. It appears first to have been introduced into Europe by M. Leschenault, in 1822, and it has since been employed with some success, especially in England. Some practitioners attribute peculiar powers to it; thus Dr. Currie (*Orient. Herald*) thinks that it has a special action on the liver, and Dr. Sigmond (*Lancet*) corroborates this opinion, and states further, that its tonic effects are more permanent than those of the other bitters, and also that it is of great benefit where the system has been weakened by the use of mercury. Churchill and Stephenson say that, "from inquiries made of a Hindoo, we ascertained that the infusion, made very strong, is taken in large doses as a tonic, and often induces vomiting from its intense bitterness. It likewise occasionally acts with freedom on the bowels, producing copious bilious evacuations, on account of which it is highly esteemed in liver complaints."

The dose of the infusion, made with half an ounce of the plant to a pint of boiling water, is an ounce or two. The tincture is also a good form, where it is used as a stomachic.

FRASERA.—*Walter.*

Calyx 4-parted; segments connected at base, persistent. Corolla deciduous, rotate, 4-

parted; segments elliptical, each with a fimbriated hollow, but no scale. Stamens 4, short, the filaments connected at base. Anthers incumbent. Ovary 1-celled, with a single style and two short stigmas. Capsule compressed, bivalved, 1-celled, with several winged seeds.

A North American genus of a few species of perennial herbs, with opposite and verticillate leaves. It was first described by Walter, who named it in honour of a Mr. Fraser. Linnæus considered the only species then known to belong to *Swertia*, in which he was followed by Sir J. E. Smith.

F. CAROLINENSIS, *Walter*.—Stem tall, striated, glabrous. Leaves verticillate, lanceolate-oblong, sessile.

Walter, *Fl. Carol.* 87; Barton, *Veg. Mat. Med.*, ii. 103; Rafinesque, *Med. Flor.*, i. 196; Griffith, *Jour. Phil. Coll. Pharm.*, iii. 269.

Common Names.—American Columbo; Columbia; Indian lettuce, &c.

Description. — Root triennial? large, yellow, rugose, horizontal. The whole plant smooth, stem from five to ten feet high, cylindrical, erect, solid. Leaves verticillate, sessile, entire; the radical elliptical and obtuse, long; cauline ones smaller and narrower. Flowers yellowish-white, numerous, forming a large pyramidal panicle; peduncles leafy or bracteate. Calyx deeply four-cleft, spreading; segments lanceolate, acute, persistent, nearly as long as the corolla. Corolla with four elliptic segments, flat and spreading; margin somewhat inflexed, a fimbriated pit in the centre of each. Stamens four, alternate with the segments; filaments short, subulate; anthers oval, oblong. Ovary compressed, bearing a short style with two short stigmas. Capsule yellowish, oval, acuminate, compressed; margin thin, two-valved, 1-seeded. Seeds flat, elliptical, winged.

Fig. 208.

F. carolinensis.

It occurs to the west of the Alleghany Mountains, from New York to Alabama, in rich woody lands and meadows. It is one of the tallest of our herbaceous plants, sometimes attaining an elevation of ten feet, with a pyramid of flowers of three or four feet in length. There is some difference of opinion as to its duration; Rafinesque stating that it is strictly a triennial, whilst other botanists agree in considering it to be a biennial. It was first discovered by Wm. Bartram, who speaks of it in his travels under the name of Indian lettuce.

The part that is officinal are the roots; these are large, yellow, rugose, hard, and spindle-shaped; when in a fresh state, they often weigh several pounds. As found in the shops, they are in slices, somewhat resembling those of the Colombo, having a thick yellow bark and a yellowish spongy meditullium. The taste is pure bitter, without any aroma. They may be distinguished from Colombo by their lighter colour, and by affording a dark-green precipitate with the salts of iron. A chemical examination has been made of this root by Mr. Douglass, (*Am. Jour. Pharm.* vi. 177,) and it was found to contain bitter Extractive, Gum, Tannin, Gallic acid, Resin, a Fatty matter, Sugar, &c.

Medical Properties.—Frasera is an efficacious bitter tonic, inferior to Colombo, but fully equal to most of the other articles of its class. It is much employed in the Western States, both in regular and domestic practice, and is spoken of in high terms by several eminent practitioners. It is only in a dried state that it displays its tonic powers, as, when recent, it proves both emetic and purgative, and is often employed as a substitute for rhubarb. The dose in powder is from thirty grains to a drachm, and of the infusion, made with an ounce of the root to a pint of boiling water, about a wineglassful, several times a day.

MENYANTHES.—*Linn.*

Fig. 209.

M. trifoliata.

Calyx 5-parted, tubular below. Corolla deciduous, somewhat funnel-shaped, fleshy; limb 5-parted, segments ciliated. Stamens 5, inserted on the corolla; filaments distinct, anthers erect. Ovary surrounded by 5 hypogynous glands; style filiform with a bilobate stigma. Capsule 1-celled, somewhat 1-valved. Seeds numerous, shining.

A genus of a single species found in almost all temperate and cold climates, and differing very slightly in any of its numerous localities.

M. TRIFOLIATA, *Linn.*—Leaves ternate, oval, glabrous.

Linn., *Sp. Pl.* 207; Woodville, ii. 277; Stephenson and Churchill, ii. 85; Bigelow, *Am. Med. Bot.* iii. 55; Rafinesque, *Med. Flor.* ii. 33.

Common Names.—Buck-bean; Bog-bean; Marsh-trefolia; Water Shamrock.

Foreign Names.—Trefle d'eau, *Fr.*; Trifoglio palustre, *It.*; Bitterklee, *Ger.*

Description.—Root long and creeping and jointed. Stem smooth, erect, and cylindrical, about a foot in height. Leaves

bright-green, obovate, undulate, smooth, ternate, at the end of a long striated footstalk. Flowers in a loose spike at the extremity of an erect, round, smooth scape, longer than the leaves, sheathed at base. Calyx divided into five, somewhat spreading segments. Corolla somewhat funnel-shaped, deeply cleft into five spreading or recurved, pointed segments, of a white colour tipped with rose, smooth externally and covered with dense white, shaggy fibres on the inner surface. The ovary is conical and supports a long slender style with a bilobate stigma. The capsule is ovate, succulent, 1-celled, containing several small, roundish seeds.

It is found in most parts of the world where the climate is temperate or cold, in moist, boggy soils, or even in ponds and ditches, flowering in this country in April and May. Rafinesque is of opinion that the plant of North America is specifically different from that of Europe, and has called it *M. verna*, but other botanists consider it identical, the only observable difference being, that it is smaller. The whole plant is medicinal, but the root alone is recognised by the U. S. Pharmacopœia. It has no odour, but is intensely bitter. It has been analyzed by Tromsdorff, and found to contain Bitter Extractive, Albumen, Green resin, a peculiar Matter, precipitable by tannin, but soluble in water, Fecula, Malic acid, &c.

Medical Properties.—In small doses tonic and astringent; in large ones cathartic and sometimes emetic, especially when given in the fresh state. It is rarely employed in medicine, but is analogous in its action to gentian and centaury, and may be employed in all cases to which they are applicable. At one time it was in high repute in rheumatism, dropsy, scurvy, and worms, and Cullen speaks favourably of it in obstinate cutaneous affections. It is used in some parts of Europe as a substitute for hops in brewing. It may be given in powder, infusion, or extract; the dose of the first is a scruple to half a drachm; the usual mode is in infusion, made with half an ounce of the dried root to a pint of boiling water, the dose of which is an ounce or two.

Besides these plants, several others of the order merit a short notice. The *Swertia perennis* is used in Siberia as a vulnerary, and it is considered that the *Pleurogyne rotata* is equally efficacious (Pallas, *Voy.* iv. 465). According to Aublet, *Schultesia stenophylla* and *Apophragma tenuifolia* are esteemed as febrifuges (*Guiane*, i. 71). Several species of *Lisianthus* are employed in South America: thus *L. purpurascens* and *L. grandiflorus* are noticed by Aublet, and the *L. pendulus* and *L. amplissimus* by Martius (*Jour. Chim. Med.* iii. 448), as powerful tonics and febrifuges. The younger Linnæus (*Supplem.* 134) states, that *L. chelonoides* acts as a powerful purgative, which is also the case with the *Eustoma exaltata*. The roots of *Coutoubea ramosa* and *C. spicata* are said to be febrifuge, deobstruent, and vermifuge. (Aublet, *Guiane*, i. 73.) De Candolle speaks of *Villarsia ovata* as used as a tonic at the Cape of Good Hope. *Limnanthemum indica* is esteemed a holy plant by the Chinese on account of its many virtues (*Mem. Acad. Dijon*, 1829, 204), and the *L. nymphoides* has some reputation as a febrifuge in Europe, whilst it congener, *L. peltata*, is employed in like manner in Japan, where they also use the leaves as a culinary vegetable. (Thunberg, *Voy.* iv. 76.) *Cicendia hyssopifolia* is stated by Wight and Arnott to be bitter, and useful as a stomachic in decoction or powder. In large doses it is laxative. (*Comp. to Bot. Mag.* ii. 250.)

Order 74.—LOGANIACEÆ.—*Lindley.*

Calyx inferior, 4—5-parted, valvate or imbricate. Corolla regular or irregular, 4—5 or 10-cleft, with a valvate or convolute æstivation. Stamens inserted on the tube of the corolla, on the same line, not always symmetrical with the lobes. Anthers bilocular, with a longitudinal dehiscence; pollen with 3 bands. Ovary superior, 2-celled; style simple; stigma simple or bilobate. Fruit a capsule and 2-celled, or drupaceous with 1—2-seeded stones, or berried with the seeds immersed in a pulp. Seeds often peltate, sometimes winged; embryo small; albumen fleshy or cartilaginous.

These plants are principally tropical or subtropical, very few of them being found in colder latitudes. They are trees, shrubs or herbs, with opposite entire leaves, usually having stipules which adhere to the petioles, or are combined in the form of interpetiolary sheaths. Most of them are exceedingly poisonous, as is exemplified in various species of *Strychnos*. Some are anthelmintic, as *Spigelia*, and some are bitter and emetic, as *Potalia amara*. In *P. resinifera*, the leaves are mucilaginous and astringent, and are employed in Brazil in cases of ophthalmia (Martius, *Nov. Gen. &c. Bras.* ii. 90).

Sub-order 1. Spigeliæ.—Flowers isomerous. Æstivation valvate. Capsule didymous, many-seeded. Seed not winged. Generally herbaceous. Stipules sometimes wanting.

Spigelia.—*Linn.*

Calyx inferior, deeply 5-cleft, segments small, pointed, permanent. Corolla funnel-shaped, much longer than the calyx, narrowed at base; limb spreading, 5-cleft, segments broad, acuminate. Stamens five, simple; anthers simple. Ovary superior; style single, subulate, as long as corolla; stigma simple. Capsule didymous, 2-celled, 4-valved. Seeds numerous, minute.

A genus of about thirty species, principally natives of tropical America, consisting of both suffruticose and herbaceous plants, with opposite and often connate leaves on the lower part of the stem, and quaternate above; flowers mostly sessile and secund, of a blue or red colour; the roots and seeds often anthelmintic.

S. marilandica, *Linn.*—Perennial, stem simple, quadrangular; leaves opposite, sessile, ovate-lanceolate; flowers crimson, in a simple, terminal, secund raceme.

Linn., *Sp. Pl.* 249; Bigelow, *Am. Med. Bot.* i. 146; Barton, *Veg. Mat. Med.* ii. 75; Rafinesque, *Med. Flor.* ii. 89; Woodville, ii. 288; Stephenson and Churchill, i. vii.; Griffith, *Jour. Phil. Coll. Pharm.* iv. 1.

Common Names.—Pink Root; Carolina Pink; Indian Pink; Worm Grass, &c.

Foreign Names.—Spigelie de Maryland, *Fr.;* Spigelia, *It.;* Nordamerikanische Spigelie, *Ger.*

Description.—Root consisting of a great number of slender fibres, yellow. Stems many, somewhat 4-angled, smooth, annual, of a purplish colour, furnished with sessile, opposite, ovate, entire leaves, glabrous except on the margins and nervures, where they are pubescent. The flowers few in number, are borne in a terminal raceme, which is secund, and are supported on short pedicels. The corolla is funnel-shaped, contracted towards the top, and divided into five acute segments. It is of a rich carmine colour externally, and

orange-yellow within. The calyx is persistent, of five long finely-serrated leaves, which are reflected when the fruit is mature. The stamens are shorter than the corolla, with oblong and narrow anthers. The style is about the length of the corolla, with a fusiform, acute, pubescent stigma. The capsule is double, and contains many angular small seeds.

Fig. 210.

S. marilandica.

The Pink root is a native of the Southern and Southwestern States, but has become rare as far north as Virginia. It grows in dry rich soils, on the borders of woods, and flowers from May to July. There are several varieties, both as respects the form of the leaves and the colour of the flowers. It was known to the natives as a vermifuge, and was in domestic use among the early colonists in the Southern States, a long time before it attracted the notice of the medical public. At about the same period, however, it was brought forward as a remedy of much power by Drs. Garden, Lining, and Chalmers, of Carolina, and from the information they gave, it became generally employed. The officinal portion is the root; this consists of a great number of slender, blackish fibres, forming a dense bunch, arising from a short rhizome. The odour is very feeble and the taste sweetish, bitter and unpleasant. It has been analyzed several times, and found to contain an Oil, Acrid Resin, a Bitter Extractive, on which the vermifuge power depends, Tannin, Gallic Acid, some salts, &c.

Medical Properties.—Pink root is a powerful and certain anthelmintic. The whole plant is possessed of this property, but the root being the most active, is generally employed, and this is most striking when in a fresh state, as there is no article that deteriorates more by exposure and keeping. In conjunction with its anthelmintic qualities, it also sometimes displays those of a purgative, and some writers have attributed all its virtues to this action; but this is erroneous, as it manifests its peculiar power on the worms, without exciting an increased action of the intestines, and hence the usual practice of prescribing a purge after the exhibition of Spigelia. It is far more probable that its vermifuge qualities depend on the same principle that induces the narcotic symptoms, to which it occasionally gives rise. These are dimness of sight, giddiness, dilated pupil, spasmodic motions of the muscles of the eyes, and even convulsions. Dr. Chalmers attributes the death of two children with these symptoms, to the use of this article. (*His. So. Car.*)

Dr. Eberle gives a very full account of its narcotic effects in a child of six years of age (*Treat. Mat. Med.*) These symptoms, following the administration of Spigelia, have been thought by some to depend either on the roots of some other plant gathered with the Pink root, or on some parasitic vine that had attached itself to it. Mr. Elliot has shown that both these suggestions are erroneous, and that the root itself is narcotic.

Its use has not been confined to the expulsion of worms. As early as 1763, Dr. Garden, in a letter to Dr. Hope, states that he had given it with great success in febrile attacks, apparently arising from a disordered condition of the stomach and bowels; this is confirmed by Dr. Ives, and in fact almost every practitioner must have met with proofs of its efficacy in those febrile complaints in children, arising from irritation of the bowels, from any cause. Of this character was the protracted remittent with hydrocephalic symptoms, in which Dr. B. S. Barton found the Pink root of so much service. Rafinesque states that it is used among the Osages, as a sudorific and sedative in acute diseases. As an anthelmintic it is more generally prescribed than any other article in this country, and in most cases with unequivocal success, and without the production of any unpleasant symptoms. It may be given in powder or infusion; the dose of the first of which for children is from ten to twenty grains. The infusion, however, is by far the best mode of administration; this is made with an ounce of the root to a pint of water, the dose of which is from an ounce to two ounces for a child. One of the best methods is to give a full dose at bed-time, and to exhibit an active purgative in the morning, as in this way any narcotic symptoms it may display do not cause uneasiness.

The most general plan is to give it in combination, especially with Senna; this forms a very well known and efficacious nostrum called *Worm tea*, for which there are several recipes, differing somewhat in the quantities of the ingredients. One of them much used, is, Spigelia, ℥ss.; Senna, ℥ij.; Savin, ℥ss.; and Manna, ℥ij., to be infused in a pint of water and strained; the dose is the same as of the simple infusion; it usually purges actively, and does not excite narcotic symptoms. The syrup is also said to be an efficacious form of preparation.

Many other species possess the same anthelmintic powers as the above, especially the *S. anthelmia* or Brinvilliers, as it is called in the French West Indies, where it grows in abundance. From the accounts given of it by Ricord Madiana (*Tr. de la Brinvilliers*), it appears to be far more active than the *S. marilandica*, as he states that it is used by the negroes as a poison. It is employed both in the West Indies and in South America as an anthelmintic, but in much smaller doses than above indicated for the other species, two drachms only being used to the pint of water. Martius speaks of *S. glabrata* as a poison.

Sub-order 2. Strychneæ.—Fruit a bilocular berry or capsule, many-seeded, sometimes by abortion 1-celled, and many-seeded. Seeds peltate, not winged.

Strychnos.—*Linn.*

Calyx 4—5-parted. Corolla tubular, with a spreading limb, 4—5-parted, and a valvate æstivation. Stamens 4—5, inserted on the throat of the corolla, which is either naked or bearded. Ovary 2-celled, with a single style, having a capitate stigma. Berry corticated, 1-celled, many-seeded, or by abortion one-seeded. Seeds nidulant, discoidal. Albumen cartilaginous, almost divided into two plates. Embryo with leafy cotyledons.

A large genus of trees or shrubs, often scandent and principally peculiar to warm countries, with opposite, entire leaves on short petioles, and white or

greenish-white flowers, in axillary or terminal corymbs, and are often fragrant. It is the most virulently poisonous group of plants known, containing besides the Nux Vomica, the Upas and Wourali, two of the most active and rapidly deleterious agents yet discovered.

S. NUX VOMICA, *Linn.*—Stem arborescent, without spines or tendrils. Leaves ovate, petiolate, three or five-nerved, smooth. Corymbs terminal. Calyx with five short teeth. Corolla glabrous within. Fruit a many-seeded berry.

Linn., *Sp. Pl.* 271 ; Woodville, ii. 222 ; Roxburgh, *Coromand.* i. 8 ; Stephenson and Churchill, i. 52 ; Lindley, *Flor. Med.* 528.

Common Names.—Poison Nut ; Nux vomica.

Foreign Names.—Noix vomique, *Fr.;* Noce canina, *It.;* Krähenaugen, *Ger.;* Koochla, *Hind.;* Luzalke, *Arab.*

Description.—A middle-sized tree, with a short, crooked, thickish trunk, irregularly branched, and covered with a smooth, ash-coloured bark. The leaves are opposite, on short petioles, ovate, shining, smooth on both sides, entire, three to five-nerved. The flowers are small, greenish-white, and collected into small, terminal cymes, with a disagreeable odour. The calyx is 5-toothed and deciduous. The corolla is of a greenish-white, and divided into five segments. The stamens are five, very short, with roundish anthers. The ovary is superior, roundish, and crowned with a single style, as long as the corolla. The fruit is a berry, of the size of an orange, globular, covered with a smooth, hard rind, of a deep-yellow, and filled with a pulp, in which are five seeds ; these are flat, round, with a prominence in the centre, of a grayish colour externally, and covered with a woolly matter, but internally hard and tough, like horn.

Fig. 211.

S. nux vomica.

It is a native of the East Indies, and is very common on the coast of Coromandel, where it flowers in the cold season. It appears to have been introduced into practice by the Arabian physicians, who probably obtained their knowledge of it from the Hindoos. The plant spoken of by Dioscorides and Pliny, under the name of Strychnos, was a kind of nightshade. The seeds are the officinal part, but the bark has attracted some attention under the name of *false angustura*, and was falsely attributed to a species of *Brucea*.

The seeds are round, peltate, less than an inch in diameter, nearly flat, or convex on one side, and concave on the other, and surrounded by narrow annular striæ. They have two coats ; the outer is simple, fibrous, and covered with short, silky hairs, of a gray or yellowish colour ; within this is the inner coat, which is very thin. The nucleus is formed of the albumen and embryo ; the first is bipartite, cartilaginous, or horny, of a dirty-white colour, and an intensely bitter taste ; the embryo is white, in the centre of the seed. They have been analyzed by several chemists ; the most complete examination of them is that by Pelletier and Caventou. (*Ann. Chim. et Phys.* xii. 142.) They found : Igasuric acid, in combination with Strychnia and Brucia, Wax, Oil, Gum, &c. The two alkaloids are the active and poisonous principles, and are very similar in their effects, but the first is the most energetic.

The bark is in quills or flat pieces, more compact and heavy than true angustura. The external appearance varies, being sometimes of a fungoid or spongy, rust-coloured appearance, at others, covered with whitish prominences. The taste is intensely bitter, and the colour of the powder of a yellowish-white. It was at first imported into Hamburgh, and sold as angustura bark ; but some cases of poisoning resulting from its administration, the sale of it

was forbidden. For a long time its origin was unknown, and it was supposed to be derived from the *Brucea ferruginea*, but this was disproved by Geiger, on a comparison of the two barks. It was then asserted by Batka that it must be the product of a Strychnos, founding his supposition on its composition and properties; this was confirmed by Dr. Pereira, and fully established by Dr. O'Shaughnessy. (*Mad. Jour.* and *Am. Jour. Pharm.* iv. 144.) An analysis of it by the above-mentioned chemists shows it to contain, Gallate of Brucia, Fatty matter, Gum, Yellow colouring matter, &c.

Medical Properties.—Nux vomica and its alkaloids are powerful poisons, its action being principally on the cerebro-spinal system. In small doses, it usually acts as a tonic, and increases the secretion of urine, and sometimes operates somewhat on the bowels, or produces a sudorific effect. When the dose is somewhat larger, the stomach is disordered, and uneasiness and nausea induced; on increasing the quantity, a new train of phenomena are induced; a sense of weight and weakness in the limbs, and increased sensibility to external impressions of all kinds, manifest themselves, soon followed by depression of the spirits and anxiety; a trembling of the limbs ensues, with slight convulsive motions of the muscles; if the medicine be repeated, these symptoms increase; there is a universal convulsion of all parts of the body, especially when motion is attempted, and erotic symptoms frequently occur. In paralytic patients the convulsive motions are principally confined to the affected parts. In still larger doses, tetanus, asphyxia, and death, are the result.

The mode in which the medicine causes these effects is not clearly understood, especially why it first displays its influence on paralysed limbs. Several explanations have been attempted by Segulas, Marshall Hall, and others, but none of them are perfectly satisfactory. (See Pereira, *Elem. Mat. Med.* ii. 366.)

The principal employment of Nux vomica is in the treatment of paralysis, especially when it is of some standing, and where no hyperæmic or hæmorrhagic condition of the nervous centres exists, for it is usually inapplicable in the recent forms, or until the removal of the primary affection by bleeding or other antiphlogistic measures. Its use is limited to those cases where, all inflammatory action or congestion being removed, there is no return of power to the paralysed parts. It has been found more useful in paraplegia than in hemiplegia, and has also been found of benefit in some local palsies. It has also been recommended in dysentery, pyrosis, and other disorders of the alimentary canal, and has been found of some utility, though not of such decided powers as to supersede other and less dangerous remedies. It has been given in cases of impotence with some benefit, but sufficient trials have not been made to establish its exact operation in these cases.

It is used in the form of powder, tincture, and extract; the dose of the first is from two to three grains, gradually increased; of the tincture, five to ten drops; and of the extract, half a grain, to be gradually increased to two or three.

Strychnia and Brucia have the same properties as the Nux vomica, and the first is generally substituted for it, from possessing greater certainty and uniformity of action. From its excessively poisonous nature, great care is requisite in administering it, more especially as it appears, like digitalis, to sometimes accumulate in the system. This alkaloid is also used externally, either in the form of an ointment, or sprinkled on a blistered surface. The dose of Strychnia or its salts is from a twentieth to a sixteenth of a grain, gradually increasing the dose, until its effects on the muscular system become apparent. Brucia is seldom employed, but from the experiments of Dr.

Bardsley and others, it is shown to be analogous in its effects to Strychnia, but less intense.

Several other species of Strychnos have attracted much attention for their poisonous properties; of these the *S. tieuté*, or *Upas*, and *S. toxifera*, or Wourali, are the most celebrated. The first of these is a large climbing shrub, found in Java, where it is used as a poison, generally in combination with another Upas, the *Antiaris*. Although extremely powerful, it is not as rapid in its effects as the Wourali, which is a native of South America, and has been fully noticed by Mr. Waterton (*Wanderings*), and by Schomburgh (*Ann. Nat. Hist.* vii. 411).

Among this collection of deadly poisons, there are two species that are endowed with far different powers, *S. pseudoquina* and the *S. potatorum*. The former, which is a native of Brazil, and is known under the name of *Quina do Campo*, is employed as a substitute for Cinchona. It contains neither strychnia nor brucia; the other, found in several parts of the East Indies, produces a fruit, the pulp of which is eaten, and the seeds very extensively used for the purpose of clearing muddy water, and hence they are called "clearing nuts." The Hindoos never drink well-water if they can procure it from a pond or river, and it is, therefore, always more or less impure. One of the seeds of this plant rubbed very hard for a short time on the inside of a vessel containing muddy water, will cause a subsidence of the impurities in a few minutes, leaving the fluid pure and wholesome.

Strychnos colubrina is stated by Blume to produce the true Lignum colubrinum, once so much esteemed in paralysis, and still employed in Java in cases of intermittent fever, and as an anthelmintic, and also externally in diseases of the skin (*Ainslie*, ii. 202). Virey states that an over-dose excites tremors and vomiting, but in small ones it is a useful vermifuge, and has been given with advantage in intermittents (*Hist. Nat. Med.* 91). According to Roxburgh and Blume, other species also furnish this wood. The *S. brachiata* bears innoxious fruit, which are eagerly eaten by deer, and those of *S. pseudoquina* are esteemed in Brazil. Those of *S. innocua*, a native of Africa, are said by Caillaud to be acidulous and pleasant, without any dangerous qualities.

Ignatia.—*Linn.*

Calyx 5-toothed, campanulate. Corolla infundibuliform, tube narrow, elongated; limb 5-parted, lobes oblong, obtuse. Stamens 5, inserted at lower part of tube, included; filaments filiform; anthers connivent. Ovary ovoid. Style filiform; stigma bipartite, lobes filiform. Fruit with a woody rind, 1-celled. Seeds numerous, smooth, with obtuse angles. Embryo straight, in the axis of cartilaginous albumen.

A genus of a single species, with opposite, petiolate, ovate, acute, entire leaves. Flowers in small, axillary panicles, of a white colour, and with the odour of the Jasmine. It was included in Strychnos by the elder Linnæus but separated by his son under the present name.

I. amara, *Linn.*—The only species.

Linn., *Suppl.* 149; Petiver, *Phil. Trans.* xxi. t. i. f. 4–6; De Candolle, *Prod.* ix. 18; *Flore. Med.* iii. 165.

Common Name.—Bean of St. Ignatius.

Foreign Names.—Feve St. Ignace, *Fr.;* Fava di S. Ignazio, *It.*

Description.—A tree with long, cylindrical, glabrous branches, with opposite, almost sessile, ovate, acuminate, entire, glabrous leaves. The flowers are white, odorous, tubular in axillary clusters. The fruit is about the size of an apple, ovoid, and smooth, its rind

is dry and brittle; the seeds, about twenty in number, are immersed in a soft pulp; they are irregularly angular, about an inch long, of a pale-brown colour, striated and glabrous; internally they are of a greenish tint, and of a horny consistence.

This tree is a native of the Philippine Islands, Cochin China, &c. It was first made known by a Jesuit called Camelli, who sent specimens to Ray and Petiver, who published an account in the Philosophical Transactions in 1669. From the Jesuits having first promulgated the properties of this article, the genus was dedicated to the founder of their order, and the seeds, which are the parts used, are named after him in all the languages of Europe. They are extremely bitter, without any smell. Like the Nux vomica they contain strychnia in combination with igasuric acid, but in less proportion. They were analyzed by MM. Pelletier and Caventou (*Ann. de Chim.* x. 147). They were first brought to Europe by the Portuguese, about the end of the seventeenth century. Father Camelli, who first noticed them in his communication to Ray and Petiver, is of opinion that they were "nuces vomicæ, legitimæ Serapionis."

Medical Uses, &c.—These seeds may be employed in all cases in which Nux vomica is required, and for the extraction of Strychnia; but as this active principle is less abundant in them, they have gone very much out of use. They are prescribed in Manilla in cholera, and the raspings as an external astringent (Petiver, *o. c.*) According to Loureiro, they are esteemed in Cochin China as a panacea, being considered as tonic, diaphoretic, emmenagogue, anthelmintic, &c.; he says he has administered this remedy a thousand times, generally with success, and never with any ill consequences (*Flor. Coch.* 156). They were much prescribed by Dr. Witz in epilepsy, and it is stated with much benefit (*Bull. Sci. Med.* xi. 74). The German, and other European journals, contain numerous papers on the efficacy of this remedy in a variety of other diseases, but it is seldom employed in England, France, or the United States.

Order 75.—CONVOLVULACEÆ.—*Ventenat.*

Calyx five-parted, imbricated, persistent. Corolla plaited and twisted in æstivation; limb often entire. Stamens 5, inserted on the tube near the base. Ovary 2—4-celled; styles united, or more or less distinct. Capsule 2—4, or by abortion, 1-celled; septifragal. Seeds large, with a little mucilaginous albumen.

A large order of twining or trailing herbs or shrubs, often with a milky juice; the leaves alternate, entire, or variously cleft. Flowers generally large and showy. They are principally natives of tropical regions, though some few are found in cold climates. Many of them contain a peculiar purgative, resinous matter, especially in their thickened or tuberous roots. Some, however, have so little of it that they are eatable and nutritive.

Batatas.—*Choisy.*

Sepals 5. Corolla campanulate. Stamens included. Style 1. Stigma capitate, bilobate. Ovary 4-celled, or by abortion 2—3-celled.

A small genus separated from *Convolvulus* and *Ipomœa* by Choisy, differing from the first in having but one stigma, and from the latter in the fruit being more than two-celled. The roots are often tuberous, and contain a large proportion of fecula, especially in the cultivated state.

B. jalapa, *Choisy.*—Stem trailing or climbing, leaves cordate, entire, sinuate, or lobate,

beneath pubescent, on long petioles; peduncles pilose, 1—3-flowered; sepals ovate-rounded, pubescent; seeds covered with a long, silky down.

Choisy, *Convol. rar.* 125; Linn. (*Convolvulus*), *Sp. Pl.* i. 860; Pursh (*Ipomœa*), *Flor.* i. 146; Michaux, *Fl. Bor. Am.* i. 141; Nuttall (*I. mechoacana*), *Sill. Jour.* 1822; Elliott (*C. macrorhizus*), *Sketches*, i. 252.

Description.—Root perennial, somewhat fusiform, very large, weighing when old, from forty to fifty pounds, white, farinaceous. Stem twining, slightly angled, pubescent. Leaves when young, acute, and tomentose beneath; when old, often obtuse, and slightly muricate; petioles one to two inches long. Peduncles long, one to three-flowered. Calyx pubescent. Corolla large, limb obscurely ten-lobed, externally pubescent, white, tinged with purple. Filaments unequal, as long as the tube of the corolla, villous, and purple at base. Style as long as the stamens, with a bilobate stigma. Capsule 2—3-celled. Seeds dark brown, clothed with long, silky, brown hairs. The whole plant abounds in a lactescent juice.

This plant is a native of Mexico, and the southern parts of the United States, and is the species supposed by Linnæus to furnish the officinal Jalap, and sent by Michaux to the Botanic Garden in Paris, under the name of *Ipomea macrorhiza*, which was figured by Desfontaines (*Ann. du. Mus.* ii.), as affording the purgative root; this opinion was also held by Pursh, who calls it *Ipomœa jalapa;* it is also *C. mechoacana* of several botanists, but as is now satisfactorily shown, does not furnish the jalap of commerce, nor do its properties agree with those attributed to the *mechoacan*, under which name it is highly probable that several species of the Convolvulaceæ are confounded. According to Dr. Baldwin (Elliott, *Sketches*, l. c.), it has no cathartic effect, nor was any resin found in it on analysis; he further states that it contains much saccharine and farinaceous matter, and probably is not more cathartic than the sweet potato. Yet it is said by De Candolle that it is purgative, and in the *Flor. Med. des Antilles*, it is stated that it affords a white resin, which is too powerful to be used. Under the name of Mechoacan, the earlier writers clearly included all purgative roots coming from America, and at all resembling Jalap, and to add to the confusion, it is said by many writers that Linnæus had described a species of *Convolvulus* under that name; Mr. Nuttall observes (*Amer. Dispens.* 374), "of which I have not been able to obtain any account, being omitted in all the editions of the Species Plantarum, to which I have had access." The fact is, Linnæus made no such species, but in his Materia Medica he says, "*Convolvulus americanus, Mechoacana dicta, &c.*" The first to give this name was Vitman.

What is called Mechoacan by Guibourt, is the product of *C. mechoacan*, which is considered by De Candolle to be the same as the *I. macrorhiza* of Michaux, is a root from South America, in variously shaped pieces, deprived of its epidermis, white and farinaceous within, having no odour, and a slightly acrid taste, and is slightly purgative. Although this article is not now used, it was deemed deserving of notice, on account of its having been mistaken for jalap.

Another species of this genus is of far more interest, as forming an important article of food,—this is the *B. edulis*, or Sweet Potato, originally a native of the East Indies, but now so extensively cultivated in the West Indies and this country. The root of *B. paniculatus* is cathartic, and is employed medicinally in India.

Ipomæa.—*Linn.*

Calyx 5 sepals. Corolla campanulate. Stamens included. Style 1. Stigma capitate, often bilobate. Ovary bilocular; cells with 2 ovules. Capsule 2-celled.

A very extensive genus, and one that has been ill-defined, and even now, as exposed by Choisy, containing several species that may belong to other genera. It is very closely allied to *Convolvulus*, and resembles it in most particulars. The largest proportion of the species are natives of warm climates. Several among them have highly purgative roots, but they are by no means uniform in their qualities. There are about 300 species described.

I. PURGA, *Wenderoth.*—Leaves cordate, acuminate, entire, deeply sinuated at base, smooth. Peduncles 1—2, rarely 3-flowered. Sepals obtuse. Corolla salver-shaped, with a cylindrical tube. Stamens a little exserted.

Wenderoth, *Pharm. Centralb.*, i. 457; Lindley, *Flor. Med.* 396; Royle, (*I. jalapa,*) *Ill. Hymal.*, 308; *J. R. Coxe*, (*I. jalapa,*) *Am. Jour. Med. Sci.* 1830.

Common Name.—Jalap Plant.
Foreign Names.—Jalap, *Fr.;* Scialappa, *It.;* Jalappenharz, *Ger.*

Fig. 212.

I. purga.

Description.—Root roundish or pear-shaped, perennial; tubers sending out long radicles. Stems several, roundish, herbaceous, of a reddish-brown colour, much twisted, smooth. Leaves cordate, entire, smooth, conspicuously acuminate, and deeply sinuated at base, the lower ones sometimes almost hastate, the under surface prominently veined, the footstalks often nearly the length of the leaf. Peduncles about the length of the petioles, two, rarely three-flowered. Calyx ebracteate, five-parted, obtuse, two of the divisions external. Corolla salver-shaped, of a lilac-purple colour. Stamens five. Anthers oblong, white, somewhat exserted. Ovary slender, bilocular. Style slender. Stigma capitate. Seed not known.

The Jalap plant is found in Mexico, at a considerable height above the sea, and the roots are generally exported from Jalapa by way of Vera Cruz. Until within a few years there has existed much difference of opinion respecting the species of the Convolvulaceæ furnishing this valuable purgative.

The first author who speaks of Jalap in a definite manner is G. Bauhin, in 1609, (*Pinax*, 298,) under the name of *Bryonia mechoacana nigricans.* Ray (*Hist. Plant.*, 724) referred it to Convolvulus, as *C. Americanus, jalapium dictus*, in which he was followed by Plukenett (*Phytog. Tab.* f. 1). Some time afterwards Tournefort, misled by Plumier and Lignon, who stated that they had seen the plant in America, attributed the jalap to a species of *Mirabilis* (*Inst. Rei Herb.*, 130), and this erroneous idea was also adopted by Lemery, in the second edition of his great work on drugs, where he figures a Mirabilis as the jalap plant. (*Pl. VI. f.* 13.) But Miller (*Gard. Dict.*), and Sloane (*Hist. Jam.*), again referred it to Convolvulus, and their views were confirmed by Houston, who brought the plant from South America and showed it to Jussieu, who decided that it belonged to that genus.

Linnæus, however, in the first edition of his Materia Medica, adhered to the opinion of Tournefort, and attributed it to the *Mirabilis longiflora*. Some years afterwards he recognised his error, and placed it in the genus Convolvulus, under the specific name of *Jalapa* (*Mant.* i. 42); this, as before noticed, is now shown to be the same as the *Ipomœa macrorhiza*. Murray (*Appar. Med.* i. 216), on the authority of Thiery de Menonville, thought that there might be more than one species of Convolvulus furnishing the officinal jalap, the latter having stated that he found a species near Vera Cruz, which he affirmed to be the true jalap, and the roots of which weighed 25 pounds. He drew up a description of this plant, and transmitted it to Jussieu and Desfontaines, and the latter, on comparing it with that of the *Ipomœa macrorhiza*, specimens of which were growing in the Garden of Plants at Paris, was convinced that the plants were identical; hence when Michaux discovered the latter in Florida, and sent the seeds to Paris, Desfontaines published a memoir (*Ann. du Mus.*, ii. 220), in which he described it as *I. macrorhiza*, and gave the *C. jalapa* of preceding botanists as synonymous; this opinion was adopted by Pursh, W. P. C. Barton, and others, but the accuracy of it was first doubted by Mr. Elliott (*Sketches*, i. 253), on the authority of Dr. Baldwin, as has been already stated.

In 1827, Dr. J. R. Coxe having received roots of the true jalap from South America, published an account of it (*Am. Jour. Med. Sci.*, 1830), but unfortunately under the name of *Ipomœa jalapa vel macrorhiza*. In 1829, M. Ledannois sent a short description of the same plant to M. Chevallier at Paris. The same year in which Dr. Coxe's account of it appeared, it was also described by Dr. Schiede (*Linnea*, v. 473), and Dr. Wenderoth (*Pharm. Centralb.* i. 457), under the name of *I. purga*, and described and figured by Zuccarini in 1832. (*Act. Acad. Reg. Monac.* x.) To conclude this subject, it may be stated that in 1837 Dr. Wood received tubers of the true plant from Vera Cruz, which produced plants having the same characters as those described by Dr. Coxe, and also that these roots had all the sensible properties of the officinal drug (Carson, *Am. Jour. Pharm.* iv. 28). The question may therefore be considered as settled, and the *I. purga* looked upon as the officinal species. It should be noticed that Dr. Christison (*Proceed. Bot. Soc.*) states that specimens derived from Dr. Wood's plants do not exactly coincide with the plates of *I. purga* as figured by Hayne, or *I. Schiediana*, Nees, (non Hamilton, *Bot. Reg.* 1838.)

It only remains to make a few observations on the representations given; that of Lemery is so bad that it is impossible to decide whether it is intended for a *Convolvulus* or a *Mirabilis*. The *C. jalapa* of Woodville resembles very closely one of the varieties of *I. pandurata;* that of the *Botanical Magazine*, 1572, and of Desfontaines (*l. c.*), are figures of *B. jalapa*. The true plant is figured in the *American Journal Med. Sci.* (*l. c.*), and *American Dispensatory*, 1830; in *Botanical Register*, 1839; by Nees, *Off. Plan.*, Supp. 3, t. 13.

The root, as found in the market, is in pieces of various forms and sizes; when entire, they are more or less oval, but are generally in slices. The epidermis is thin and brown; and when they are broken, of a deep yellowish-gray colour, with brown, concentric rings. They should be heavy, hard, and difficult to powder, but there is much variation even in the true Jalap; besides which it is adulterated with what is called Male Jalap, first described by M. Ledannois, and supposed to be the product of the *I. orizabensis*, Stendel. Jalap is also liable to be worm-eaten, but this does not injure its purgative qualities. The odour of Jalap is nauseous, and the taste sweetish, sub-acrid, and unpleasant. From the various analyses of it, it is shown to contain Resin,

Extractive, Gum, Starch, &c. The resin consists of two substances, *Jalapine* composing nine-tenths of it, and *Jalapic* acid.

Medical Properties.—Jalap is an active but safe purgative, producing copious liquid stools, often causing nausea and sometimes vomiting, and almost always griping. It is applicable to all cases where it is wished to make a powerful impression on the bowels and to produce copious evacuations, and is to be avoided where there is intestinal inflammation or lesions of the contiguous parts. Its hydragogue effects are much increased by combination with cremor tartar. It is given alone or in combination, as well as in tincture and extract. The dose of the powder is from ten to twenty grains, of the tincture from a drachm to four drachms, and of the extract from ten grains to a scruple. A very common combination is with calomel, ten grains of each.

2. I. PANDURATA, *Meyer.*—Stem twining, sub-pubescent. Leaves cordate, or panduriform, acuminate, lobes rounded, peduncles 1—5-flowered; bracts small, at the base of the peduncles; flowers fasciculate; corolla tubular, campanulate.

Linn., (*Convolvulus*,) *Sp. Pl.* 219; Barton, *Veg. Mat. Med.* i. 249; Rafinesque, *Med. Flor.* i. 123; Meyer, (*Ipomœa*,) *Prim. Esseq.* 100; Lindley, *Med. Flor.* 396.

Fig. 213.

I. pandurata.

Common Names.—Wild Potato; Wild Rhubarb; Wild Jalap; Mechameck.

Description.—Root perennial, very large, cylindrical or fusiform, sometimes as thick as the arm and several feet in length, yellowish outside, whitish and milky within, much fissured, attenuated above. Stem procumbent or climbing, round, purplish. Leaves cordate at base, broad, alternate, petiolate, margin entire or undulate, sometimes panduriform, smooth, dark-green above, paler beneath. Flowers in fascicles of two to five, on peduncles longer than the petioles, axillary. Calyx 5-parted, unequal, ovate-obtuse, two larger sepals external. Corolla large, funnel-shaped, white, with the tube purplish-red. Stamens white, anthers oblong. Style white, filiform, with a bilobate stigma. Capsule oblong, 2-celled, 4-seeded.

Common in all parts of the United States in sandy or gravelly soils, and also found in Guiana and other places in South America, flowering from June to August. It was known to the Indians, and is noticed by Schœpf as Mechoacana, which he says it resembles in appearance and properties. In the fresh state the root has an unplea-

sant odour, and a bitter and acrid taste. In drying, the root loses about three-fourths its weight. As found in the shops, it is usually in circular pieces of various sizes, being transverse sections, the colour somewhat brown externally and whitish within, with radiating striæ. They are powdered with difficulty, the powder is light and gray. According to an analysis by Mr. Shinn (*Am. Journ. Pharm.* v. 177), this root contains Resin, Bitter extractive, Starch, Gum, Gallic acid, &c.

Medical Properties.—The real qualities of this article are not well ascertained. Dr. B. S. Barton (*Collections*), says he knows nothing of it from experience; but that an extract but little inferior to scammony has been procured from one of the native species of Convolvulus, and further states that it was used with great success by Dr. Harris, of New Jersey, in calculous complaints, and also that it had obtained some celebrity in Virginia in the same disease; it was generally given in decoction. It has also a reputation among empirics, and in domestic practice, as a substitute for rhubarb and jalap, but is much feebler in its action than either, as it requires large doses to produce any effect. Elliott observes, that it certainly possesses some cathartic power, but in too slight a degree to bring it into use. The extract may perhaps be found useful, but certainly can never be equal to scammony. The dose of the powder is forty grains to a drachm.

Another species of this genus, the *I. turpethum*, a native of several parts of Asia, was at one time in very general use as a purgative, but is now seldom employed, although it certainly possesses active properties; according to Ainslie, it is much esteemed by the native practitioners in India, and even in Europe it is spoken of in high terms by some writers, but is never prescribed in this country. The *I. pes caprœ*, *corymbosa*, *discolor*, and many others, have likewise been employed in different countries. A purgative resin is also obtained from *I. tuberosa;* and it is stated by Mr. Hartweg that what is called Male Jalap is the product of the *I. batatoides* (Lindley, *Veg. King.* 631). *I. operculata* yields a purgative drug called *Gomma da Batata*, which is said to be equal to Jalap (Gomez, *Obs. Bot. Med.* 23). *I. cathartica* has also a purgative root, employed as a cathartic in St. Domingo; it is said to often cause superpurgation.

Lindley is of opinion that *I. oririzabensis* is the "Jalapa macho," or male Jalap of Mexico, specimens of which were sent to France by M. Ledannois, and described by M. Pelletan in the *Journ. Chim. Med.* x. 1. It is the *I. mestilantica* (Choisy); and M. Ledannois states that the roots are a good purgative, without possessing the acridity of the common Jalap, and that he always administered them with success (*Journ. Phil. Coll. Pharm.* iii. 265). Lindley further states that Dr. Schiede had seen the roots, and found them to be very like that of *I. purga* (*Flor. Med.* 397).

Convolvulus.—*Linn.*

Sepals 5. Corolla campanulate. Style 1; stigmas 2; linear-cylindrical, often revolute. Ovary 2-celled, with 4 ovules. Capsule 2-celled.

Almost as extensive a genus as Ipomœa, and resembling it in many respects in its botanical as well as its physical characters.

C. scammonia, *Linn.*—Stem smooth; leaves sagittate, posteriorly truncate; lobes entire or elongate-laciniate; peduncles very long, many-flowered.

Linn., *Sp. Pl.* 218; Woodville, ii. 243; Stokes, i. 322; Stephenson and Churchill, i. 60; Lindley, *Flor. Med.* 398.

Common Names.—Scammony; Syrian Bind-weed.

Foreign Names.—Scammonée, *Fr.;* Scammonea, *It.;* Scammonium, *Ger.*

Description.—Root fleshy, fusiform, with a light-gray epidermis, and abounding in a milky juice. Stems several, slender, cylindrical, villous. The leaves are sagittate, alternate, smooth, pointed, of a bright-green colour, truncate at base, and supported on long petioles. The flowers are on slender, erect stems, divided above into two or more pedicels, each supporting a pale-yellow flower. Calyx with 5 emarginate sepals. Corolla funnel-shaped; limb entire, somewhat reflexed. Stamens five; ovary 2-celled, supporting a long slender style, with two linear, cylindrical stigmas. Capsule two-celled, with small pyramidal seeds.

It is a native of Turkey, Syria, Greece, Persia, &c. According to Russel, it is found in great abundance on the mountains between Aleppo and Latakia, whence most part of the Scammony of commerce is obtained.

The time for collecting the milky juice, which, when inspissated, forms the drug known as Scammony, is in the beginning of June; this is done as follows. "Having cleared away the earth from the upper part of the root, the top is cut off in an oblique direction, about two inches below where the stalks spring from it. Under the most depending part of the slope, a shell is fixed, or some other convenient receptacle, into which the milky juice gradually flows. It is then left about twelve hours, which time is sufficient for the drawing off the whole juice; this, however, is in small quantity, each root affording but a few drachms. This milky juice, from the several roots, is put together, often into the leg of an old boot, for want of some more proper vessel, when in a little time it grows hard, and is the genuine scammony. It is the root only that produces this concrete, for the stalks and leaves near the root, even when pressed, afford no signs of a milky juice. Of this entirely pure scammony, but very little is ever brought to market, the greatest part of what is to be met with, being adulterated." (Russel, *Med. Inquir.*, i. 18.) This adulteration is principally practised at the ports from whence it is shipped, and consists of various admixtures of sand, ashes, chalk, &c., and probably of an extract of some other vegetable. There are several varieties met with in commerce. The best is light, resinous when broken, and is friable, not effervescing on the addition of an acid, nor rendered blue by iodine; the colour varies much, especially in large masses; but when good, it is always of a brownish-gray colour in powder. Russel states, that those who gather it assert, that the difference of colour depends on the different modes of drying it. Pereira has given a very full description of the varieties of this drug found in London, which applies also to those occurring in the shops in this country. (*Elem. Mat. Med.*, ii. 339.)

It has been several times examined, with different results, according to the purity of specimens operated upon. In the first quality, Aleppo, Macquart found Resin, Wax, Extractive, Gum, Albumen, &c. Besides the true Scammony, there are a number of other products bearing the same name, either wholly fictitious or derived from other plants, the best known of which is called Smyrna Scammony, and is said, though the fact is not proved, to be obtained from a species of *Secamone*, and the French or Montpellier is the product of a *Cynanchum*.

Medical Properties.—Scammony was employed as a drastic purgative by Hippocrates and other Greek physicians, but it has been thought that the article they used was produced by other species of the Convolvulaceæ. It was also used by the Roman practitioners, and Celsus speaks of it as a good anthelmintic. The Arabian writers, with the exception of Rhazes, thought it too powerful a remedy to be employed, and even he advises it to be used

with great caution. It is a powerful and highly drastic purgative, but is highly useful, when not contra-indicated by intestinal inflammation, both as an evacuant and a derivative. Where it is wished to moderate its action, it may be given in combination with some of the Neutral salts, Rhubarb, &c., with the addition of an aromatic. It is very seldom given alone, on account of the harshness of its operation, except when it is intended to establish counter-irritation, as in diseases of the brain. It is much used by empirics, and forms a part of most of the vegetable pills so numerous in our quack-ridden country. The dose of the powder is from ten to fifteen grains, and it should be powdered very finely. It enters into the composition of a variety of officinal preparations, as powders, confections, mixtures, &c.

Several other species have also, at different times, been employed in medicine, as the *C. arvensis*, *C. althœoides*, &c. The *C. dissectus* abounds in prussic acid, and is said to be used in the manufacture of Noyau. (*Bot. Mag.* 3141.) According to Dr. Uslar, the remedy called in Mexico Guaco, is derived from a Convolvulus. (Lindley, *Veg. King.*, 631.)

Besides these plants, numerous species of other genera belonging to this order may be cited as having remedial properties. Thus *Pharbitis cathartica* of St. Domingo, has much the same properties as Jalap; it is the *P. pudibundus*, *Bot. Reg.* 999; the *P. nil* is used in Japan (*Thunberg*, iv. 53). *Calystegia soldanella* and *C. sepium*, have been much used in Europe; Dr. Deslongchamps, who examined the first with great care, is of opinion that it is almost equivalent to the Jalap. (*Jour. Gen. Med.* xlii. 173.) It is spoken of in high terms by Ferrein and others as a hydragogue and vermifuge; the *P. sepium*, is much less active, but it is said that a decoction of its leaves acts well as a mild purgative. The foliage of *I. bracteata* is employed in Brazil in a similar manner, and that of *Argyreia bracteata* and *A. speciosa* are used in India in preparing emollient poultices; they are also thought to possess virtues in cutaneous complaints, rubbed on the affected parts (*Ainslie*, ii. 357). Two species of *Rhodoriza*, the *florida* and *scoparius*, yield an aromatic essential oil, of a bitter balsamic flavour, known as the Oil of Rhodium. The wood itself, when powdered, is used as a sternutatory, and is also employed for fumigation; the oil is much used by rat-catchers to attract rats and mice, as they appear to be extremely fond of the odour. Even the seeds of some of these plants are active; this is the case with those of *Pharbitis cærulea*, which act as a quick, safe, and pleasant purgative, in doses of 30—40 grains. (Lindley, *Veg. King.* 631.)

Order 76.—SOLANACEÆ.—*Lindley.*

Calyx of 4—5 more or less united sepals, mostly persistent. Corolla regular, sometimes a little irregular, plaited in æstivation. Stamens inserted upon and as many as the segments of the corolla. Ovary 2-celled, with the placentæ in the axis; styles and stigmas united into one. Fruit a many-seeded capsule or berry. Embryo mostly curved, in a fleshy albumen.

A very extensive order, consisting of herbs or shrubby plants, with a watery juice, and alternate leaves; the floral ones sometimes double, placed near each other. The inflorescence is variable, often supra-axillary, the pedicels ebracteate. The species are found in all parts of the world, except the frigid zone. The properties of this order are not uniform, though the general character is that of the acro-narcotics, but the fruit of some species and the roots of others are among the most valuable esculents, and the fruits of others, again, are purely stimulant.

Among the poisonous species, one of the most striking is the *Acocanthera venenata*, a large bush with fragrant flowers, found at the Cape of Good Hope; a decoction of its bark is said to be a fatal poison, and is used by the Hottentots to destroy wild beasts. (*Thunberg*, ii. 173.) Some of the *Cestrums*, as the *macrophyllum* and *nocturnum*, are also very poisonous; an extract made from the berries of the latter, has been given in doses of 2—5 grains in chorea with some success. (*Flor. Med. Antill.*, iii. 47.) Others of this genus, as *C. parqui*, *bracteatum*, &c., are found to have a diuretic action, and are also emollient, and applied to ulcers and wounds; the unripe fruits are said to be used in Brazil in affections of the liver and bladder. (*Martius.*) The ripe berries of *C. tinctorium* afford an indelible ink; but other properties belong to species of this genus, as *C. hediunda*, *pseudoquina*, and *laurifolium*, are used as tonics and febrifuges, and also applied externally, in decoction, in œdema and hæmorrhoids. (*Martius.*) The different species of *Physalis* are of some importance; the root of *P. flexuosa*, is considered in India as deobstruent and diuretic, and also to possess some alexipharmic powers, and the leaves, dipped in castor oil, are applied to carbuncular swellings. (*Ainslie*, ii. 14.) The leaves of *P. somnifera* are thought, in Egypt, to dissipate local pains and inflammations; the roots are narcotic. (*Forskäl.* 99.) The *P. alkekengi* has been celebrated as a diuretic from the time of Dioscorides, and has been employed in jaundice, retention of urine, &c., and Ray says the berries will prevent an attack of gout. (Murray, *Apparat. Med.* i. 679.) Our native species have also been prescribed as diuretics and sedatives. The berries of all of them are edible; they are acid with a slight bitterness.

The leaves of some species of *Saracha*, found in Peru, are bitter, and are employed in the form of an ointment as anodyne and emollient. (*Ruiz and Pavon.*) The *Himeranthus uncinatus* of South America, is considered, by the natives, as an aphrodisiac, and as inciting to the passion of love. In the genus *Lycium*, the *L. umbrosum* is esteemed as a remedy in erysipelas, in New Grenada. (Humboldt, *Nov. Gen.* iii. 54.) The *Lycion* of Dioscorides, so lauded as an astringent, and employed in dysentery, ulcers in the mouth, &c., is thought by Linnæus and Prosper Alpinus to be a plant of this genus; the latter writer figures the *L. afrum* as best agreeing with the description; other authors, however, state that it was Catechu.

Solanum.—*Linn.*

Calyx persistent, 5—10-parted. Corolla rotate, tube very short; limb 4—6-cleft, spreading. Anthers 4—6, partly united, oblong, opening at point by two pores. Berry 2—6-celled, many-seeded. Embryo spiral.

A very large genus of herbaceous or shrubby plants, naked or aculeate, but seldom spiny, with the leaves simple, but often sinuately lobed, sometimes pseudo-pinnate, or growing in pairs; peduncles several or solitary. Pubescence stellate. With a few exceptions the species are indigenous to the warm portions of America, extending also to Asia and Africa.

S. dulcamara, *Linn.*—Stem twining, shrubby, without thorns. Upper leaves hastate. Racemes compound, corymbiform, drooping.

Linn., *Sp. Pl.* 264; Woodville, t. 33; Stephenson and Churchill, i. 17; Rafinesque, *Med. Flor.* ii. 86; Bigelow, *Am. Med. Bot.* i. 169; Lindley, *Flor. Med.* 511.

Common Names.—Bitter sweet; Woody Nightshade.

Foreign Names.—Douce amere, *Fr.*; Dulcamara, *It.*; Bittersuss, *Ger.*

Description.—A woody vine, creeping, or climbing, when supported, to the height of eight or ten feet, covered with a grayish-green bark on the stem and large branches. Leaves alternate, acute, mostly smooth, though sometimes pubescent, of a dull green colour, and petiolate. They are subcordate towards the base of the plant, but more or less hastate above. The flowers are in branched cymose racemes, opposite the leaves, or terminal, drooping, divaricate, and on alternately subdivided peduncles. The calyx is small, acute. The corolla is rotate, five-cleft segments, acute, ovate, violet-coloured, with two whitish spots at base. The filaments are very short, the anthers erect, yellow, somewhat connected into a conical tube. Ovary roundish, bearing a filiform style, longer than the anthers, with a simple, obtuse stigma. The fruit is a scarlet, oval berry, containing several whitish, plano-convex seeds.

Fig. 214.

S. dulcamara.

The Bitter-sweet is indigenous to Europe, and is naturalized extensively, if it be not a native of this country; it grows in shady, fertile situations, especially where there is some moisture; flowering from June to August, and ripening its fruit in the fall, the berries remaining on the vine during most of the winter. There are several varieties of it, founded on the form of the leaves, and their smoothness or pubescence. The officinal portion is the small stems. These should be collected in the autumn, after the leaves have fallen. When fresh the smell is heavy and disagreeable, but in a dried state it is inodorous. In both conditions they have a slightly bitter taste, followed by a peculiar sweetness. They give out their properties to water, but boiling for any time destroyssome of their powers. On analysis they have been found to contain, a Bitter-sweet extractive (*Dulcarin*), Vegeto-animal matter, Gummy extractive, Solanina, &c. The Dulcarin or *picroglycion*, Pfaff, is a crystalline substance, having a bitter and sweet taste, and is thought by Soubeiran to be Solanina united to sugar. Solanina was discovered by Desfosses; it exists in other species of the genus, and is allied in many respects to the other alkaloids discovered in the Solanaceæ, but is not as powerful in its action on the system.

Medical Properties.—The medical qualities of the Bitter-sweet are those of a narcotic, diuretic, and diaphoretic, but its powers are not very great, though in large doses it certainly will induce the effects of the acro-narcotics, cases of poisoning having been recorded from the berries as well as from the decoction of the twigs. This decoction has attained some note as a remedy in chronic rheumatism, asthma, chronic catarrhs, and in those morbid conditions of the system in which sarsaparilla has been found beneficial. Its main reputation, however, has arisen from the benefit obtained from it in skin diseases of an obstinate character, as lepra and pityriasis; in these, there is strong evidence that it has proved eminently successful, both administered internally and used as a wash to the affected parts. It is also said that it operates as an anaphrodisiac when given for any length of time. The usual form of administration is in decoction, made with an ounce of the twigs to a pint and a half of water, boiled down to a pint; of this the dose is about a

wineglassful, three or four times a day, until the appearance of slight narcotic symptoms indicate that the remedy is acting on the system.

Many other species of Solanum have been employed medicinally, especially the *S. nigrum* or common *Nightshade*, a variety of which, the *virginianum*, is so abundant in this country. It appears to possess the same properties as the Bitter-sweet, but in a greater degree; this may be accounted for by the fact that *Solanina* exists in it in a greater proportion. Gataker, who tried it extensively, states that he found it a powerful narcotic, sudorific, cathartic, and diuretic (*Obs. on Solanum*), and Orfila (*Toxicol. Gen.* ii. 190), says he found an extract of it equal in power and energy to lactucarium. It has been employed in the same description of cases as the Bitter-sweet. The leaves are used in Brazil in poultices or decoction to painful wounds.

The *S. tuberosum* or Potato is of more interest as an article of diet than as a medicinal agent, though the stalks possess the narcotic qualities of the other species, and even the tubers contain a certain portion of the alkaloid; this appears to be confined to their epidermis, and is greatly increased in quantity where the Potato is exposed for any time to the action of the light, in which case the epidermis assumes a greenish colour, and the poisonous principle is so much developed as to render the root unfit for food. The water in which potatoes are boiled contains solanina. The Potato contains much starch, which is contained in a cellular tissue; this starch, which is the principal nutritious ingredient of the tuber, is used as a substitute for arrow-root, and is also so manufactured as to resemble and to be sold for sago. The Potato in a raw state eaten as a salad with vinegar has proved of much benefit on shipboard as a preventive of scurvy; it sometimes acts on the bowels, and even induces slight narcotic symptoms. An extract of the leaves is highly spoken of by Mr. Dyer in chronic rheumatism and painful affections of the stomach and bowels; he is of opinion that it ranks between Conium and Belladonna (*Pharm. Jour.* i. 590). Much difference of opinion has existed among naturalists as to the native country of the Potato, and from what place and by whom it was first carried to Europe. Some confusion has arisen from confounding it with the Batatas or sweet potato. The first definite record of it is by P. Cieca (*Chronica di Peru*) in 1553; he says the natives of Peru have, besides maize, a tubercular root, they call *Papas*. After this it is noticed by Gomara in 1554, and Cardan (*De Rerum, var.* 16) in 1557. It is usually stated that it was carried to England from Virginia or Carolina by Sir Walter Raleigh in 1586, but this is not satisfactorily ascertained. Two years afterwards, P. de Sivry sent Clusius two tubers, which were planted, and from the plants, Clusius described and gave the first representation of it in 1599. (*Plant. Rar.* l. iv. 79.) It has been found wild in Peru by Dr. Baldwin (*Reliquiæ Baldwin*), and by Pavon (*Jour. Sci. and Arts*, No. 9, 138).

For further information on the subject, the following papers may be consulted with advantage: Dunal, *Histoire Naturelle et Medicale des Solanum*, 1813, most of the historical portions of which are taken from Bauhin (*Hist. Plant.* iii. 621); and an excellent synopsis by G. Ord, in the *Annals of Nat. Hist.* xvii. 1846. Besides the uses of the Potato as an article of diet, the stalks furnish a large quantity of potash, and it is said that if the stalks were appropriated to this manufacture, that they would supply most that is required in commerce. They also afford a bright yellow dye, which is obtained by cutting them when in flower, and bruising and pressing them to extract the juice. (*Jour. Sci. and Arts*, v.)

The *S. lycopersicon* (*Lycopersicum esculentum*) or Tomato, whose esculent fruit is in such general use in this country, is also a native of South America. The leaves, which have a nauseous and narcotic odour, contain an alkaloid

which is very analogous to, if it be not identical with *Solanina*, a peculiar Oil, and an Animalized extractive; they have not been given remedially, but it is probable that they will be found to possess the properties of those of many others of the genus. The fruit contains a peculiar acid, and a brown, tarry, odorous, resinous matter, with some indications of the presence of an alkaloid. (*Jour. Phil. Coll. Pharm.* iv. 224.) They form a very healthy article of food, and are stated to act on the biliary functions in a very marked manner.

Another edible fruit of this genus, is furnished by the *S. melongena*, or Egg-plant; this is a native of India and Arabia, where it has long been used for food. There are several species known as Egg-plants, besides the above, the *S. ovigerum*, *S. muricatum*, &c. The berries of the following are also eaten: *S. album*, in China, according to Loureiro (*Flor. Coch.* i. 159); *S. æthiopticum*, which is a kind of Tomato, is esteemed in Japan (*Flor. Jap.* 92); *S. aguivi*, in Madagascar, according to Commerson (*Encyclop. Bot.* iv. 304); *S. quitœnse:* the fruit of this is as large and somewhat resembles an orange in appearance and smell.

Those with useful roots besides the Potato, are *S. valenzualæ*, which is a true tuberous root; it never grows large, but is as well-tasted as that of the *S. tuberosum;* it grows near Bogota, and is used in soup, according to Feuillée (*Plant. Med.* iii. 62); the root and also the leaves of *S. trilobatum* are considered in India as beneficial in phthisis in the form of an electuary (*Ainslie*, ii. 427); the root of *S. manosum* is employed in Jamaica as a diuretic (Barham, *Jam. Pl.* 117); Ainslie states that the root and fruit of *S. jacquini* are prescribed in India as an expectorant (ii. 91); the juice of *S. bahamense*, Lunan says, is employed in the West Indies in inflammation of the throat (*Hort. Jam.* i. 152); the *S. bulbocastanum*, a native of Mexico, has a tuberous root, which is a substitute for the potato. (*Encyclop. Bot.* xi. 749.)

Among the other numerous species of this genus may be mentioned *S. violaceum*, the juice of the leaves of which is deemed beneficial in Malabar in diseases of the lungs, and a decoction of them in cutaneous eruptions (*Hort. Malabar.* ii. 195); *S. oleraceum*, the leaves of which are eaten in some of the West Indies (*Dunal*); *S. vespertilio*, with whose berries the women in the Canary Islands paint their cheeks; those of *S. gnaphaloides* are used for the same purpose in Peru (*Flor. Peruv.* ii. 31); *S. fœtidum*, of which the leaves are employed in Peru to cleanse ulcers (*Nov. Gen.* &c. iii. 34); *S. indicum*,—according to Ainslie, the root is thought efficacious in dysuria and retention of urine (*Mat. Ind.* ii. 207); *S. undatum*, a woody species, of Madagascar; the root pounded and infused in wine is purgative; in small doses it arrests vomiting, and its decoction is used as a pectoral (*Encycl. Med.* iv. 843); *S. sodomeum*, a native of the Cape of Good Hope, has a large fruit, with a greenish pulp, which is acro-narcotic, occasioning headache, stupor, and delirium; the roots are acrid and bitter, and are used by the Hottentots in dropsies (*Hist. Lug. Bat.* 574); *S. saponaceum*,—the berries are employed in Peru as a substitute for soap (*Flor. Per.* ii. 39); *S. paniculatum*,—the juice of the berries and leaves are thought in the West Indies to be deobstruent; the fresh leaves are applied to wounds (*Jour. Chim. Med.* v. 423); another West India species, *S. mammosum*, has a large and poisonous fruit, which, according to Morin, contains malate of solanina; its extract in small doses has been given in cardialgia, lepra, &c. (*Flor. Med. Antill.* iii. 159); *S. coagulans*,—according to Forskäl, the juice of the berries is used in Egypt to coagulate milk (*Flor. Egypt.* 47); *S. cernuum* is employed in Brazil as a sudorific in syphilis and gonorrhœa (*Martius*).

A few have bitter and tonic barks, the most important of which is *S. pseudo-quina*, a small tree, growing in Brazil; the bark is thin, somewhat wrinkled, of a pale yellow or reddish colour, and very bitter; it is used as a substitute for Cinchona, which it is said to equal in power. It has been analyzed by Vauquelin, but no alkaloid discovered in it. It has been stated that the *Quina bicolorata* is the product of this species (*Martius*); but this does not seem to be the case. Merat and De Lens are of opinion that it is derived from the *Strychnos pseudo-quina*, whilst Guibourt attributes it to an *Exostemma*.

Many more species might be mentioned, but enough have been cited to show that the greater number of them are possessed of active or nutritive properties, and that these properties are extremely various and diversified.

Hyoscyamus.—*Linn.*

Calyx tubular, 5-cleft. Corolla funnel-shaped; limb spreading, oblique, five-lobed, unequal. Stamens five. Stigma capitate. Capsule ovate, compressed, and furrowed on each side; apex with a lid or operculum.

The name of this genus is derived from two Greek words, signifying *hog's bean*, from the capsule somewhat resembling a bean, and the plant being eaten with impunity by the hog, whilst it is poisonous to other animals. It contains a limited number of species, but all possessed of active and poisonous properties.

H. niger, *Linn.*—Leaves sinuate, amplexicaul. Flowers nearly sessile.

Fig. 215.

H. niger.

Linn., *Sp. Pl.* 257; Woodville, t. 76; Stephenson and Churchill, i. 9; Bigelow, *Med. Bot.* i. 161; Rafinesque, *Med. Flor.* i. 255; Lindley, *Med. Flor.* 508.

Common Names.—Henbane; Poison Tobacco, &c.

Foreign Names.—Jusquiame, *Fr.*; Fava porcina, *It.*; Bilsenkraut, *Ger.*

Description. — The root is fusiform, long, thick, wrinkled, brown externally, and white within. The stem rises to the height of two feet, is erect, branched, woody, cylindrical, somewhat viscid, and covered with a hairy down. The leaves surround the stem, and are alternate, large, deeply sinuated at their edges, and of a glaucous green colour. The flowers are

numerous, mostly sessile, of a straw-yellow colour, marked with purple veins, and either arise singly from the axilla of the leaves, or from long, nodding, secund spikes, at the end of the branches and stem. The corolla is monopetalous, funnel-shaped, and divided above into five obtuse segments. The calyx is tubular, 5-cleft, and persistent. The filaments are inserted into the tube of the corolla, downy at base, inclined, and bearing cordate, purple anthers. The ovary is roundish, with a filiform style, having a blunt, round stigma. The capsule is ovate, bilocular, and opening by a convex lid. It contains numerous small, obovate, unequal, brown seeds.

The Henbane is a native of Europe, and is naturalized in the northern parts of the United States, flowering in July and August. There is some difference of opinion among botanists, whether it is annual or biennial; naturally, it is probably the former, but in a state of cultivation, it may be either one or the other. The whole plant has an offensive, nauseous odour, and a forbidding appearance. It was well known to the ancients, but not as much employed by them medicinally as another species, the *H. albus*, though Dioscorides recommends the oil of the seeds in pains in the ear; this oil was also much employed by the Egyptians for lamps. The present use of the plant may be considered as owing to the experiments of Stoerk, in 1762, who found it highly beneficial as a narcotic and sedative in several morbid affections. The whole plant is officinal, and should be gathered at the time of its full inflorescence. It has a strong, fetid, narcotic odour, and abounds in a clammy juice; the taste is mucilaginous, unpleasant, and somewhat acrid. By the process of drying, it loses most of these qualities. The seeds are of a yellowish-gray colour, possess in some degree the odour of the plant, and have an oleaginous, bitter taste. They both owe their active properties to the presence of a peculiar alkaloid, discovered by Brandes, which he has called *Hyoscyamia;* it exists in the plant in the form of a malate; it is almost identical in its action on the system with *Atropina*, and differs from it mainly in being more soluble in water.

Medical Properties.—Henbane is a valuable sedative and narcotic, when administered in small and repeated doses, and is an admirable substitute for opium, where the latter disagrees, or is contra-indicated. It appears to be free from the constipating effects of opium, and does not, like that drug, lock up, as it were, the secretory and excretory passages. In moderate doses, it acts as a sedative, diminishing irritability, induces sleep, relieves pain, and obviates spasm, and has the advantage, that when conjoined with purgatives, that it does not impede their action. As it has the power of producing dilatation of the pupil, it is occasionally used instead of belladonna for that purpose, prior to operations for the removal of cataract. Henbane has also been employed as an external application to painful, glandular swellings, irritable ulcers, and other painful diseases; for this purpose, a cataplasm of the bruised leaves, or fomentations of an infusion of the herb or extract, have sometimes proved beneficial. The seeds appear to have more irritating powers than the leaves, and their administration has in some instances been followed by unpleasant symptoms, analogous to those caused by the irritant poisons.

The dose of the powdered leaves is from three to ten grains, but in this form it is seldom prescribed; of the extract, the most usual form of exhibition, it is from five to fifteen grains. It should always be remembered that no preparation varies more in strength and efficiency. Henbane is also given in the form of tincture, the dose of which is from half a drachm to a drachm.

Several other species are equally endowed with active properties; thus, the *H. albus* is generally employed in the south of Europe, and is said to be more powerful in its effects on the system than the *H. niger;* in botanical characters, it is very closely allied to it. Forskäl mentions a species, *H. datora*, a native of Arabia, the seeds of which he states are used by the natives to

produce intoxication, and supposes it to be the *Nepenthes* of Homer. (*Flor. Egypt.* 45.)

Atropa.—*Linn.*

Calyx campanulate, 5-cleft. Corolla campanulate, 5-lobed, twice the length of the calyx. Stamens five, filiform, incurved. Berry globular, 2-celled, many-seeded.

A small but very narcotic genus, whose name is derived from Atropos, one of the destinies, indicating the fate of such as become subject to its influence. The earlier botanical writers included most of the species in *Solanum*, to which it is closely allied in properties and habits. One species only is officinal, as the *A. mandragora* now is seldom employed.

Descourtilz has described a shrubby species, a native of the West Indies, which is so acrid as to paralyse the tongue, on chewing a portion of it. (*Flor. Med. Antill.* iii. 119.)

A. belladonna, *Linn.*—Stem herbaceous. Leaves ovate, entire. Flowers solitary.

Linn., *Sp. Pl.* 260; Woodville, t. i.; Stokes, *Bot. Mat. Med.* i. 394; Stephenson and Churchill, i. 1; Lindley, *Flor. Med.* 508.

Common Names.—Deadly Nightshade; Dwale; Black Cherry; Nightshade.

Foreign Names.—Belladonne, *Fr.;* Belladonna, *It.;* Tollkraut, *Ger.*

Fig. 216.

A. belladonna.

1. Stamens. 2. Style. 3. Stigma. 4. Berry and Seeds.

Description. — Root thick, fleshy, creeping, much branched. Stem erect, cylindrical, herbaceous, annual, hirsute, about three or four feet high. The branches are dichotomous, of a purplish colour, and furnished with ovate, entire, somewhat soft leaves, which are acuminate at both ends, of a dull green colour, growing in pairs, of an unequal size, on short petioles. The flowers are solitary, somewhat drooping, on short, 1-flowered, axillary peduncles. The calyx is green, persistent, and deeply divided into five ovate segments. The corolla is monopetalous, campanulate, with the limb divided into five lobes, of a lurid purple externally, darker on the upper internal surface, yellowish below. The stamens are five, shorter than the corolla, and bearing cordate, 4-lobed anthers. The ovary is spheroidal, with a nectariferous gland beneath, and supporting a long, simple style, with a 2-lobed stigma. The fruit is a 2-celled berry, about the size of a small cherry, with a transverse furrow, shining, smooth, of a dark violet-black colour, and containing numerous reniform seeds, embedded in a soft pulp.

The Belladonna is a native of Europe, and is cultivated in this country; it is also found in some parts of Asia, as Ainslie (*Mat. Ind.* i. 246) states it is well known to the Arabians and Persians, but adds that he has never met with it in India. It is generally found in places where the soil is rich and moist, especially if it be calcareous. The specific name is said to have been bestowed upon it in consequence of its having been used in Italy in the composition of cosmetics. The whole plant is officinal in some Pharmacopœias, but the leaves only are recognised in the United States. These, when fresh, have an unpleasant smell, and a feeble bitterish, sub-acrid taste; when dried they have scarcely any odour, but the taste remains the same.

It is difficult to ascertain at what time Belladonna was introduced as a remedial agent, as the ancient writers seem to have confounded this and the Mandragora. The earliest certain reference to it is by Tragus, in 1532 (*Historia*), under the name of *Solanum hortense nigrum*. It is supposed, however, to be the plant referred to by Plutarch as causing the death of so many of Antony's army during the Parthian war, as the symptoms were very analogous to those produced by Belladonna. There can be little doubt that it is the poison alluded to by Buchanan (*Rerum, Scot. Hist.* 162), as employed by Macbeth during a truce with the Danes, to poison the provisions sent to them, as the description of the plant used will apply to no other than the Belladonna.

Brandes found the leaves to contain: super-malate of *Atropia;* Pseudo-toxin, with malate of Atropia; Phytocolla; Gum, Starch, &c.; besides these, Richter states that they contain an acid, which he calls Atropic, and Lubekind has announced the existence of a volatile vegetable alkaloid, differing from atropia, which he calls *Belladonnin*. Atropia when pure is in white prismatic crystals, soluble in absolute alcohol and ether. Water at ordinary temperature dissolves only about $\frac{1}{500}$th, but takes up a much larger portion when aided by heat. This solution has a disagreeable bitter taste. This alkaloid is a very powerful poison, acting with energy in doses not exceeding a tenth of a grain, and causing dilatation of the pupil when applied to the eye in the minutest quantity. The best and simplest method of separating it is that proposed by Mein (*Jour. Phil. Coll. Pharm.* vi. 314).

Medical Properties.—Belladonna is a powerful narcotic, having, like many other articles of its class, some diaphoretic and diuretic properties, and in some rare cases has been known to produce salivation (*Lancet*, i. 403). In small doses it acts as a sedative, and almost invariably causes a peculiar dryness of the mouth and throat. In increased quantities it manifests a peculiar influence over the cerebro-spinal system, causing dilatation of the pupils, dimness or loss of vision, disturbance of the sense of hearing, vertigo, and mental confusion, accompanied with difficulty of deglutition and articulation, a sense of constriction in the throat, thirst, nausea and sometimes vomiting, and oftentimes the appearance of a red eruption. When the quantity taken is excessive, all these symptoms are greatly aggravated, the brain becomes much affected, and delirium attended with violent gestures and fits of laughter ensues, followed by a state of coma. The pupil becomes much dilated and insensible to light, the face red and tumid, the stomach and bowels insusceptible to impressions, and the whole nervous system prostrated; where the case terminates fatally, convulsions often precede the death. Dissection shows much inflammation of the digestive organs, and it is said that the body soon putrefies, it swells, becomes covered with livid spots, blood flows from the natural openings, and the stench is intolerable.

Notwithstanding the powerful effects of this article on the system, it is much employed as a remedial agent, and has been recommended and used in almost every form of disease, but more especially where it is wished to allay

pain and nervous irritation, and as an antispasmodic. It has also been much praised as a resolvent or discutient, in scirrhus and cancer, but it does not appear to act more favourably than any other powerful narcotic. In diseases of the eyes it is much employed, from its property of dilating the pupil when locally applied, and hence becomes very useful in the operation for cataract, and where it is wished to examine the condition of the inner portions of the visual organs. It has also proved useful where there is a morbid sensibility to light, and also in iritis, to prevent or to destroy adhesions.

Some years since it acquired great credit, especially in Germany, as a prophylactic in Scarlatina; for this purpose it was introduced by Hahnemann, the founder of the Homœopathic school, on the ground that as it caused an affection of the throat, and an eruption on the skin resembling those of scarlet fever, it would prevent or cure this latter, according to his axiom of "*similia similibus curantur*." A fair trial was given to it, and the result was a complete failure, at least, to use the words of Pereira, "all the facts brought forward in favour of the existence of this prophylactic power are only negative, while those that can be adduced against it are positive." Dr. Sigmond gives an instance where eleven persons in one family took the medicine as a preventive, and yet every one of them contracted the disease. (Pereira, *Elem.* ii. 316.)

The dose of the powder is one grain, to be gradually increased until the action of the remedy is manifested by dryness of the throat, and dilatation of the pupil. For children, the dose at first should not exceed an eighth of a grain. It is generally, however, given in extract, in the same way. The strength of this preparation is very variable, and it is safest therefore always to begin its use in small doses.

2. A. MANDRAGORA, *Linn.*—Stemless. Scapes 1-flowered.

Fig. 217.

A. mandragora.

Linn., *Sp. Pl.* 249; *Flor. Med.*, ii. 62; Woodville, ii. 234, t. 83.

Common Name.—Mandrake.

Foreign Names.—Mandragore, *Fr.*; Abrauntollkraut, *G.*; Mandragora, *It.*

Description.—Root fusiform, very large and long, of a greenish-brown colour, smooth, often bifurcate. Stemless. Leaves radical, large, sessile, forming a dense tuft. Scapes many, 1-flowered, short. Flowers whitish-green, with a purplish tinge, infundibuliform, somewhat tomentose. Fruit large, round, yellowish berries, containing several white, reniform seeds.

This plant is a native of the coun-

tries bordering on the Mediterranean, where it grows in rich soil. There are two varieties mentioned by old authors, the male and the female; the first having larger leaves and a round berry, whilst in the latter the leaves are narrower and more fetid, and the berries oval. The Mandragora formerly enjoyed much reputation, and the most wonderful powers were attributed to it. The root was fancied to bear so strong a resemblance to the human form, that it bore the name of *Antromorphon;* and Matthiolus (*Comment. Dioscor.*) says that it was a kind of profession in Italy to prepare these roots so as to give them the proper figure, or even to imitate them with those of Bryony, &c. It was also named *Circæa*, from its being supposed to be one of the ingredients of Circe's cup. It was collected with magic rites; a circle was three times traced round it with a naked sword, and as the person who plucked it from the ground was considered to be exposed to many dangers, it was usually torn up by fastening it, by means of a cord, to a dog, who was chastised till, in his efforts to escape, he eradicated it. It is asserted by Albertus Magnus that the most potent roots grow under a gibbet.

It was said to be eminently aphrodisiac, and was much used for the purpose of exciting love; hence the name of Mandragontis bestowed on Venus. Some commentators are of opinion that the Mandrake, mentioned in our translation of the Bible, as found by Reuben and carried to his mother Leah, was this plant; but it was evident, from the account and from the reference made to it in Solomon's song,—"the mandrakes give a smell, and at our gates are all manner of pleasant fruits,"—it is not probable that reference is had to so nauseous and offensive an article as the Mandragora. The Hebrew word *Dudaïm* is said to be derived from *Dadim*, breasts, or *Dodim*, friends, twins; and hence must mean something that is double; and as the Mandrake roots are remarkable for their bifurcate form, and are, as stated, considered to promote love, the general idea was that they were alluded to in the various texts of Scripture. But in the Talmud it is also called *Siglin*, which has been considered to be the jasmine or lily, and hence it must have had a pleasant smell. At present the most generally adopted idea is that it meant the fruit of the plantain or banana. Dr. Milligen (*Curios. Med. Experience*) seems to think that allusion was had to an orchis, which has twin roots and an agreeable smell.

Among its other properties, it had the precious one of doubling the amount of money it was placed with. It was also of great utility in detecting hidden treasures, and had a variety of other miraculous powers.

As a remedial agent, it was used by the ancients as a narcotic and stupefiant, and is constantly spoken of by Hippocrates, Galen, and Celsus, as proper to lull the pain of surgical operations, and is said to have been the drug which Hannibal infused in the wine left in his camp, when he feigned a retreat, and thus rendered his enemies, who partook of it, unable to withstand his subsequent attack. The use of it now is almost abandoned. Boerhaave, however, recommended it as a cataplasm to scrofulous tumours, and Hoffmann and Swediaur to scirrhous and syphilitic indurations. It was also prescribed, in small doses, in gout, and it is stated with much success. Pallas says that it is much employed in Siberia for a multitude of complaints. Lemery observes that it is good for inflammations of the eyes, erysipelas, scrofula, and tumours generally. Brandt and Ratzeburgh (*Pereira*, ii. 335) say that when used internally it purges violently. It does not appear to have been analyzed; but it is clear, from its very active qualities, that it contains some principle analogous to or identical with Atropia, and probably could be used in all cases to which the belladonna is applicable.

Datura.—*Linn.*

Calyx large, tubular, ventricose, 5-angled, 5-cleft above; segments caducous; base peltate, persistent. Corolla infundibuliform, plaited, 5-toothed, 5-angled. Stamens 5, equal. Style filiform. Stigma bi-lamellar. Capsule smooth or spinous, ovate, 2-celled; cells 2 or more parted by large dissepiments. Seeds numerous.

A small genus of mostly suffruticose or large herbaceous plants, with alternate leaves, and solitary, lateral flowers. They are principally natives of Asia, but one species is now naturalized in Europe and America. There is some confusion in the species, some writers considering as distinct what others regard as mere varieties. They are possessed of active properties, though one only is recognised as officinal.

D. stramonium, *Linn.*—Stem dichotomous. Leaves ovate, sinuate-angular, smooth, acute. Capsules erect, spinous, ovate.

Linn., *Sp. Pl.* 255; Woodville, ii. 197, t. 74; Bigelow, *Am. Med. Bot.*, i. 17; Stephenson and Churchill, i. 6; *Flor. Med.*, vi. 332; Lindley, *Flor. Med.* 510.

Common Names.—Thorn-apple; Jamestown Weed; Jimson, &c.

Foreign Names.—Pomme epineuse, *Fr.;* Stramonia, *It.;* Steckapful, *Ger.*

Fig. 218.

D. stramonium.

Description. — Stem erect, smooth, round, of a yellowish-green colour, dichotomous above, cylindrical, often hollow. Leaves alternate at the forks, ovate, sinuated and toothed; base decurrent, dark-green above, paler beneath; on long, cylindrical footstalks. Flowers large, erect, of a white or purplish colour, proceeding singly, on short peduncles, from the axils of the branches. The calyx is monosepalous, tubular, with 5 angles and 5 teeth, the latter of which are deciduous, but leaving a persistent rim at base. Corolla long, monopetalous; limb 5-plaited and 5-toothed. Stamens 5, the filaments adhering to the tube, and supporting oblong, erect anthers. Ovary free, but coherent at base with the persistent base of the calyx, oval, hairy. Style filiform, bearing an obtuse bi-lamellar stigma. Capsule large, ovate, thorny, 2-celled, with 2 or more large dissepiments. Seeds numerous, reniform.

It is very uncertain where the Datura was originally native. It certainly appears indigenous to America, but was first introduced into Europe from Turkey. It was brought from Constantinople by Lord Zouch, in 1597, and by the writers of that period called "Thorny Apple of Peru;" yet Garcias says, "nascitur in Malabar," and Thunberg found it in Japan. Dr. Wallich also detected a variety in Nepaul. The native name in India is *Dhetoora*, so that

there seems but little doubt that it grows naturally in the East Indies. How then is its presence at the time of the discovery to be accounted for in America? Rafinesque states positively that it has appeared in North America since the discovery by the whites, and is known among the Indians as the "white man's plant." He further states that its advance through the country can be traced from Virginia and New England, and that in the Western States it is of very recent appearance, and that it is always found near habitations; never, like truly native plants, in woods or on the mountains.

Some difference of opinion exists respecting the varieties of this plant, as besides that with green stems and white flowers, two others are found in the United States; one with purple flowers and a purple stem, dotted with green, and the second with a tall, viscid stem, somewhat pubescent leaves, and white, declining flowers. The first of these has been considered to be the *D. tatula*, and the other the *D. metel;* but they neither of them agree with the description of these species, which are of foreign origin. Rafinesque has treated of them as varieties of the *D. stramonium;* under the names of *tatuloides* and *meteloides*. This appears to be the just view of the subject, especially as regards the first, but is liable to some objections in respect to the *meteloides*, which presents differences that are truly specific. Dr. Riddell (*Synop.* 77), in speaking of *D. metel*, says that it occurs on the banks of the Ohio, and, on the authority of Dr. Locke, suggests that the seed has been transported by the river from Pittsburg, where the plant was at one time cultivated.

The Stramonium is found in most parts of the United States, in Canada, Mexico, and is said to extend to Peru. It flowers from May to September. It has an unpleasant, narcotic smell, and a bitter and nauseous taste. When it is dried, the odour, and much of the taste disappear, but this process does not appear to diminish its active properties. The parts employed in medicine are the leaves and seeds. Several analyses have been made of them, and it has been found that their peculiar properties depend on the presence of a vegetable alkali, which has received the name of *daturia*, which is very analogous in its properties to hyoscyamia, strongly dilating the pupil and exercising a poisonous influence. Mr. Morries (*Ed. Med. and Surg. Jour.* xxxix. 379), has described an empyreumatic oil, closely allied to that from the foxglove, and capable of inducing very unpleasant symptoms.

The effects of Stramonium are those of an acro-narcotic, very similar to those of belladonna, but more marked on the secretory functions. In overdoses it causes intoxication, nausea, delirium, loss of sense, drowsiness, mania, loss of memory, convulsions, paralysis, cold sweats, excessive thirst, dilatation of the pupil, &c.; the pulse is not much affected for some time, and then rather as regards strength than frequency, becoming in some cases almost imperceptible, but still retaining its natural beat as to time. In some instances an eruption resembling nettle-rash makes its appearance, either during the continuance of the other symptoms, or after these have been relieved. One of the first and one of the most curious accounts of its effects, is given by Beverly (*Hist. Virgin.* 121); he states, that "it was gathered very young, for a boiled salad, by some soldiers sent thither (Jamestown), to quell the rebellion of Bacon; and some of them ate plentifully of it; the effect of which was a very pleasant comedy, for they turned natural fools upon it for several days. One would blow up a feather in the air, another would dart straws at it with much fury; another, stark-naked, was sitting up in a corner, like a monkey, grinning and making mows at them; a fourth would fondly kiss and paw his companions, and sneer in their faces, with a countenance more antic than any Dutch doll." This lasted eleven days, when they recovered, without any recollection of what had passed.

From the universal occurrence of Stramonium in this country, numerous cases of poisoning with it have occurred, principally among children, who are fond of sucking the sweet secretion from the flowers, and often swallow the seeds. Where these cases take place, the best plan of treatment is to evacuate the stomach as speedily as possible, after which, affusion with cold water, and the regulated use of stimulants will usually be successful.

Medical Uses, &c.—It has been much prescribed in neuralgic pains, and with considerable success in the form of extract; it has no direct tendency to cause sleep, except by relieving the pain, which it sometimes does very speedily and effectually, hence in rheumatism it has afforded much relief (*Zollickoffer*). It has also been highly recommended in mania and epilepsy, and numerous cases have been recorded in which it has proved a benefit in these diseases, but the general result of the practice has not been favourable, and it is now considered rather as useful in allaying the excessive mobility of the system, than as tending to the absolute cure of the complaint (Chapman, *Therap.* ii. 230).

Its good effects have been more marked in asthma, especially of the spasmodic kind, used as an inhalation by smoking or otherwise; in many cases of this kind, it has afforded much relief, but wholly fails in others, and has also proved highly injurious in some instances, causing the most dangerous symptoms, and hence requires much caution in regulating it. Dr. Bigelow (*Am. Med. Bot.* i. 23), has given some very judicious remarks on its employment, and others will be found in Dr. Dunglison's Practice of Medicine, ii. 328. Dr. Marcet, who experimented largely with this remedy, has given the result of his observations, that many kinds of painful diseases were more relieved by it when used internally, than by any other narcotic, that its effects on the bowels were rather relaxing than astringent, and that the great objection to its employment was the occasional production of disagreeable, nervous symptoms (*Med. Trans.* 1815).

Externally it has been used to dilate the pupil and to diminish the sensibility of the eye, but, in general, belladonna is preferred. Cataplasms of the fresh leaves have been found of benefit in inflammatory tumours, and to the swelled breasts of nursing women; and an ointment made with the powdered leaves has afforded much relief in hæmorrhoids and painful ulcers. This ointment has also been recommended in nymphomania to lessen venereal excitement.

All parts of the plant are used, but the seeds, from containing most Daturia, are the most powerful. The dose of the powdered leaves is one grain; of the seeds half a grain; of the extract of the seeds a quarter of a grain; that from the leaves a grain; of the tincture ten to twenty drops; all to be gradually increased if required.

The other species are likewise very active, and possess much the same properties, but with some modifications. *D. fastuosa*, an annual plant of Egypt, with large, purplish flowers, has been employed in asthma in the form of a tincture, which Dr. Adam is of opinion might be prescribed in all cases in which that of digitalis is useful. (*Trans. Med. Phys.* i. 371.) Dr. Skipton found it beneficial in asthma, in the form of a strong decoction. (*Trans. Soc. Med. Calcut.* iv. 282.) *D. ferox*, a native of India, resembling *D. stramonium*, but having the capsules still more spinous, has the same properties, and is said by Crawford (*Ind. Archip.* i. 466), to be used by the Malays to produce stupor, and to be a powerful agent in the hands of the Chinese to effect various impositions. *D. metel*, another Indian species, has long been

known for its soporific and intoxicating powers, and has frequently been employed with criminal intentions (Fleming, *Cat. Med. Pl.*). Belon (*Singularités*, 460), thus quaintly speaks of it: "Voudroit-on chose plus singuliere que de trouver drogue pour faire incontinant dormir quelqu'un qui ne peut reposer. Ils vont chez un droguiste (car ils n'ont point d'apoticaires) auquel demandent pour demie aspre de la semence de Tatoula. Puis la baillent à celuy qui ne peut dormir. Tatoula n'est autre chose ce que les Arabes appellent nux metel. Jovius escrivant de l'Empereur Seleim, dict qu'il avoit quelques fois accoustumé manger d'une semence qui rend les gens joyeux et oste la memoire des choses qui rend les hommes pensifs et molestez des choses humaines, et que quelques heures apres que on en a mangé, l'on ne demande qu'á se resiouyr et ne permit qu'on se soucie de penser quelque chose, qui rende l'esprit tourmenté." The seeds of this plant were considered to be aphrodisiac, and are said to have been used by courtezans in India and Turkey.

D. sanguinea and *D. suaveolens*, now included by some botanists in the genus *Brugmansia*, are both natives of Peru, and are used for a variety of purposes; the leaves are made into an ointment, which is considered beneficial to ulcers, to maturate abscesses, and relieve pain. The seeds are narcotic, and a decoction of them is used to procure sleep. It is said that they were formerly used by the priestesses of the Sun before delivering their oracles. The flowers of the second-named are extremely odorous, and their emanations are dangerous in a closed apartment. (Feuillée, *Plant. Med.* ii. 761.)

Nicotiana.—*Linn.*

Calyx urceolate, 5-cleft. Corolla funnel-shaped, with the limb plaited, 5-cleft. Stamens five, inclined. Stigma emarginate. Capsule 2-valved, 2-celled, many-seeded.

This genus is almost wholly American, a very few species having been found in other parts of the world. It consists of herbaceous or rarely suffruticose plants, with terminal flowers in racemes or panicles, and all possessing an unpleasant narcotic smell. Its generic name was bestowed upon it in honour of Jean Nicot, Ambassador of Francis II. of France to Portugal; he brought some Tobacco from Lisbon, and presented it to Catherine de Medecis as an herb possessing many valuable properties. Its common name is said by some writers to be derived from Tobaco, a province of Yucatan, where the Spaniards first found it, and learned its use; others derive it from Tobago, but, according to Humboldt, it is a Haytian word, signifying the pipe or tube through which the herb is smoked. There are several species of Tobacco used, but only one is officinal.

N. tabacum, *Linn.*—Leaves oblong-lanceolate, sessile, acuminate; the lower ones decurrent. Segments of the corolla acute; throat inflated.

Linn., *Sp. Pl.* 258; Woodville, ii. 208; Stokes, i. 390; Stephenson and Churchill, i. 37; Rafinesque, *Med. Flor.*, ii. 245; Lindley, *Flor. Med.*, 513.

Common Names.—Tobacco; Virginian Tobacco.

Foreign Names.—Tabac, *Fr.*; Tabacco, *It.*; Tabak, *Ger.*

Description.—Stem erect, round, branched towards the top, rising to the height of four or five feet. The leaves are numerous, alternate, sessile, oblong, pointed, entire, of a dull-green colour; they, as well as the whole plant, are clammy and pubescent; the lower cauline leaves are decurrent; they become smaller and narrower as they approach the top. The flowers are in loose panicles, upon longish footstalks, and are furnished with long, linear, pointed bracts. The calyx is urceolate, and divided into five acute, pointed segments; the corolla is monopetalous, twice the length of the calyx, of a pale-greenish colour externally, and swelling above into an oblong cup, which expands into five pointed,

plaited, rose-coloured segments. The stamens are as long as the corolla, with oblong, compressed anthers. The ovary is ovate, and bears a long, slender style, terminated by a roundish, bilobate stigma. The capsule is ovate, and contains many small, reniform seeds.

This plant is indigenous to the warm parts of America, and was not known to Europeans before the discovery of this continent. Columbus found it in use in Hayti in 1492. Humboldt (*Person. Narr.*) states, that it was first discovered in the Mexican province of Yucatan, and that it was there called *Petum;* it was afterwards transported to the West Indies and North America, and carried to Europe by Hernandes de Toledo, who went from Florida to Lisbon about the commencement of the sixteenth century; when Raleigh took Tobacco from America to England in 1586, it was already cultivated, to some extent, in Portugal. Another strong proof of its American origin is the fact, that in this continent it is known under a different name in the various languages of the aborigines, whereas, in every part of the old world, it is only called by appellations derived from the Haytian *Tamaku*. But some writers maintain, that a Tobacco was known and used in Asia long before the discovery of America, and point out the species peculiar to that region in corroboration of this, and also affirm, that it is impossible that its use could have become so universal, especially among nations so loth to adopt new habits as those of Asia, in the short space of time that has elapsed since its introduction into Europe. Bell, in his Travels, expressly states, that the Chinese have been Tobacco smokers for ages; but allowing the fact that they smoked as he says, it does not follow that they used Tobacco. Chardin also states (*Travels*, iii. 304), that Tobacco grew in Persia 400 years before he visited it in 1660. Had this practice prevailed in Asia, there would have been some notice of it in Arabian and other works, describing the habits and manners of the inhabitants before the time of Columbus; but nothing is to be found in them respecting it. It is said by Ainslie, that as far as he can learn, Tobacco was first brought to India from Brazil in 1617, and he alludes to a proclamation of Jahangir, that it was introduced during his or the preceding reign. (*Mat. Ind.* i. 447.) Other writers assign an earlier date, and say that it was taken to India by the Portuguese in 1599. From India its use extended to China and Persia, whilst the more western Asiatic nations received the habit from Europe. Sandys, who was at Constantinople in 1610, speaks of Tobacco smoking, as a new custom among the Turks.

The use seems to have spread with very great rapidity; for at a very early date after its introduction severe edicts appeared against the custom in various countries; thus it was prohibited in Turkey by Amurath IV. at the time of Sandys' visit alluded to above; and Sir Thomas Herbert mentions that there was a severe edict against it in Persia in 1628; in 1634 it was denounced in Russia, and twenty years afterwards in Switzerland, where its use was considered so heinous as to be classed as a crime next to adultery; it was also prohibited in Denmark by Christian IV.; James I. of England not only endeavoured to prevent its consumption by taxing it heavily, and ordering that no planter in Virginia should grow more than one hundred pounds, but also wrote a book against it, "*A Counterblast to Tobacco.*" By a bull of Urban VIII. all persons using tobacco in church were excommunicated. Numerous laws and enactments on the subject might be cited; but enough have been noticed to show how rapidly the habit of employing a naturally repulsive article gained ground, and how impossible it was to eradicate it. For though, to use the words of King James, it is "a custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs, and in the black stinking fume thereof, most resembling the horrible Stygian smoke

of the pit that is bottomless," it is now universal both in civilized and savage nations; and it is a strange fact that no custom is so soon acquired and so difficult to relinquish as that of using this weed.

It appears to thrive in all parts of the world; several species are cultivated, but the principal are *N. tabacum*, *N. paniculata*, and *N. rustica;* and from these an immense number of varieties have been derived, differing in appearance and in the quality of the leaf, according to species, locality, and mode of cultivation. The mildest are said to be derived from the *N. rustica*, which is the origin of the Syrian and Turkish kinds (Royle, *Illus.* 283), and was the kind carried to Europe and used by Sir W. Raleigh. The celebrated and fragrant tobacco of Shiraz is stated by Lindley to be derived from the *N. Persica*. Most of the American sorts are the product of varieties of *N. tabacum*, though some of the milder are stated to be from the *N. rustica*, *paniculata*, and *repanda*. A full account of the commercial distinctions will be found in Macculloch's *Dictionary of Commerce*, and a brief synopsis in Pereira, (ii. 324.)

Tobacco is manufactured in various forms to fit it for smoking, snuffing, or chewing; and the consumption is so immense that no estimate can be made of the quantity yearly used in these different forms throughout the world. The average export from the United States for late years has been upwards of 100,000 hhds.; to which must be added the vast home market.

The leaf, as met with in commerce, is of various shades of colour, with a peculiar and narcotic odour, and a bitter, nauseous taste. The darker the hue, the stronger is the tobacco, and the greater its action on the system. It has been analyzed by many chemists both in the fresh, dried, and manufactured state, and with very various results; but it is generally admitted at present that it owes its powers to an alkali called *nicotina;* this exists in all parts of the plant, and has very energetic properties; it is a colourless, liquid, volatile alkali, with a strong odour of tobacco, and an acrid, burning taste; it combines with acids, forming salts, some of which are crystallizable. Half a grain will produce the most aggravated symptoms in a cat (Turnpenny, *Journ. Phil. Coll. Pharm.* v. 198). It also affords a concrete volatile oil, the *nicotianin* of Humboldt (Schweigger, *Journ.* xxxi. 441); this is only procurable from the dried leaf, and appears to be developed in the process of curing; it is strongly endowed with the properties of the plant, as is also the *empyreumatic* oil. Dr. Paris (*Med. Jur.* ii. 417) is of opinion that "the juice of cursed hebenon," by which the father of Hamlet is said by Shakspeare to have been poisoned, was the essential oil of tobacco, as it is supposed that the poet used the word *hebenon* for *henebon*, or henbane, which was, according to Gerarde, one of the names then used for tobacco.

The effects of tobacco on the human system are various, according to the dose and habituation to its use. In small doses it causes a sensation of heat in the throat, with some nausea and sense of swimming in the head, followed by diuresis, and sometimes by purgation. In larger quantities it induces much nausea, vomiting, and purging, with giddiness, and a feeling of sinking at the pit of the stomach; the pulse becomes small and weak, the surface cold and clammy, the respiration impeded, and sometimes convulsive actions of the muscles. In over-doses, these symptoms are increased, paralysis and coma ensue, followed by death. The same train of phenomena are present, when the leaves are smoked by those unaccustomed to their use, and in several cases death has ensued. Chewing will produce the same consequences in those who attempt it for the first time; in those who have become habituated to it, it is liable to cause a derangement of the digestive functions, with a disordered condition of the nervous system, attended with a morbid action of the

heart and other organs. The ill effects of smoking are not so well marked, though a depraved condition of the system may often be traced to this source. As regards snuffing, the principal effect produced is purely local; though, where the snuff is very strong, and especially in those who are unaccustomed to its use, it will sometimes cause giddiness; where it is taken in large quantities it may bring on dyspepsia and the other symptoms heretofore spoken of, in consequence of its passing into the throat and stomach. (See Dunglison, *Human Health*, 330.)

Where it is employed in the form of a clyster, its operation is in most cases very violent, and sometimes fatal, even when directed by the most careful and experienced practitioner. The application of it to abraded surfaces has likewise been followed by evil consequences; and even applied to the sound skin in the form of a cataplasm or decoction, it is often productive of its usual influence. Tobacco is very analogous in its operation to Lobelia, but differs essentially from those of Hyoscyamus, Stramonium, or Belladonna, though its action on the system has been compared to that of these several articles.

Medical Uses.—The great power this substance exercises on the muscular system has led to its use in many spasmodic diseases; and it has proved beneficial in colic, ileus, suppression of urine, and strangulated hernia, and has generally been applied in the form of a clyster, either of the infusion or of the smoke; but is seldom resorted to until most other means of relief have failed, from the danger always attendant on its operation; but in some cases has proved eminently beneficial. It has also been used in substance as a suppository to provoke the action of the bowels. The employment of its smoke or infusion in asphyxia from drowning, once so highly recommended, has now very properly been abandoned. Dr. O'Brien, of Dublin, warmly advocates the use of Tobacco enemata in tetanus and dysentery.

It has been favourably noticed by Dr. Fowler (*Med. Rep.*) in dropsy, and has been advantageously spoken of by others; but as digitalis is more certain in its diuretic effects, and causes less distress to the patient, is now but seldom prescribed for this purpose. In dropsy and retention of urine, it has produced good effects from its powerful relaxing powers, and from its diminishing the sensibility of the parts. In tetanus it has at times been of much benefit; Mr. Curling (*Treat. on Tet.*) notices it in the most favourable terms, and states that it has never been known to fail when fairly tried during the early stages of the disease. In fact in all spasmodic diseases it has occasionally been of much service, both given internally or applied topically. Dr. Godman detailed a case in which a snuff cataplasm to the throat relieved a child of a paroxysm of croup that had resisted other remedies, and Dr. Wood (*U. S. Dispen.*) notices a case of spasm of the rima glottidis, removed by a tobacco cataplasm after copious venesection had been unavailingly tried. In spasmodic asthma, both the tincture and smoking have been beneficial. It has also been used as an anthelmintic.

It is seldom given in substance, the wine or infusion being the general modes of administration when exhibited by the mouth; the infusion or smoke when used as an injection, and the cataplasm or ointment when employed externally. The infusion, made with an ounce of tobacco to a pint of boiling water, may be given in doses of 60—100 drops. When used as an injection, from 20—30 grains to the pint of water is usually sufficient, and a stronger one might prove dangerous; even these proportions have caused death. The dose of the wine is from 10—40 drops.

CAPSICUM.—*Tournefort.*

Calyx 5-toothed, persistent. Corolla rotate, 5-cleft. Stamens 5, with converging anthers, which are two-celled, dehiscing by fissures. Fruit a juiceless, coriaceous berry, 2—4-celled, many-seeded. Seeds naked.

A genus almost exclusively of American tropical plants, but the species are now naturalized in most warm climates; they are usually herbaceous, or suffruticose annuals, or perennials, and are distinguished by the hot and pungent character of their fruits. One species only is officinal, though all of them possess the same qualities.

C. ANNUUM, *Linn.*—Stem herbaceous. Peduncles solitary, smooth. Fruit pendulous, oblong.

Linn., *Sp. Pl.* 270; Woodville, t. 80; Stephenson and Churchill, i. 44; Lindley, *Flor. Med.*, 509.

Common Names.—Red Pepper; Capsicum; Cayenne Pepper.
Foreign Names.—Poivre d'Inde, *Fr.;* Pepperone, *It.;* Spanischer, oder Turkischer Pfeffer, *Ger.*

Description.—Annual, from one to two feet high. Stem herbaceous, crooked, much branched, smooth, somewhat angular. Leaves ovate, acuminate, smooth, entire, of a dark green colour, supported on long petioles. Flowers solitary, on curved peduncles, arising from the axils of the leaves; of a greenish-white colour. The calyx is persistent, tubular, and five-lobed. The corolla is rotate, with a five-cleft limb. The stamens are five, with oblong anthers. The ovary is ovate, with a filiform style, terminated by a blunt stigma. The fruit is a long, pendulous, inflated berry or pod, smooth, shining, of a crimson or yellow colour; two-celled, containing a spongy pulp, and numerous flat, kidney-shaped seeds.

This species varies much in the form and colour of its pods. It is generally considered to be a native both of Asia and America, and to be the *Piperitii* or *Siliquastrum* of Pliny; but as late writers are of opinion that it is not a native of the former of these countries, that author could not have been acquainted with it. At the same time, if it be not the plant known to the Romans, there is scarcely any other to which the description will apply, except to the *C. frutescens*, which is the *C. indicum* of Rheede, and this is said to have been used in the East from time immemorial, and is stated by Crawfurd (*Archipel.*, 182), to grow wild in the Eastern Islands; but is likewise supposed by Rumphius to be American, from its Malay name being of Mexican or Peruvian origin. Be this as it may, the two are now cultivated in all parts of the world, and more especially in warm climates, where they are consumed in large quantities as a condiment, as is also another species, the *C. baccatum* or Bird pepper; all are known under the common name of *Chillies*. The *C. annuum* is much cultivated in this country, principally for culinary purposes, those used in medicine being generally imported from Africa and the West Indies.

In tropical countries Chillies are used in great quantities, and are supposed to aid the digestive functions, so generally weakened by a residence in hot climates. The inhabitants of these regions not only employ them as a seasoning to their food, but eat them raw with relish, whilst strangers from more temperate parts cannot support with impunity their pungent and acrid action on the mouth and throat.

These peppers when dried and ground form what is called *Cayenne Pepper*, the best of which is made from *C. baccatum*, or from the African, which

appears to be derived from a variety of the *C. frutescens*. Much use is also made of the round or bell-shaped variety of the *C. annuum*, in a green state for pickling; this variety has received the name of *C. grossum*, but does not differ, except in the form of its fruit, from the *annuum*.

Several analyses have been made of these fruits; according to Bucholz, (1816) the active principle is a soft acrid Resin, which he calls *Capsicin;* this is obtained by digesting an alcoholic extract of Capsicum in ether, and evaporating. It is a thick fluid, of a yellowish or brownish-red colour, which evaporates in thick fumes at a high temperature. It is extremely acrid. Witting stated, in 1822, that he had obtained an alkaloid which was clearly the active principle, and which he calls *Capsicina*. It is very probable, however, as in the Black pepper, that the active portion is the oil, and that the crystallizable substance is neutral and inactive, owing its apparent powers to an admixture of the oil.

Medical Uses.—Although the principal use of Capsicum is rather as a condiment than as a medicine, it is also much employed remedially, especially by the Thomsonians, who prescribe it in almost every complaint. Being a powerful stimulant, it has been found very useful in enfeebled, languid, and torpid conditions of the digestive organs, and has been very advantageously administered in atonic gout, where there is much flatulence, as in the habitual drunkard. (Dunglison, *Therap.* i. 467.) It appears to act more locally than generally, as its influence over the circulation is not proportionate to its topical effect. This is well known to the inhabitants of warm climates, who assert, that whilst the use of Black pepper heats them, such is not the case with the red, which seems to spend its influence on the gastric organs. It is also given in conjunction with tonics, in some forms of intermittent, where there is torpidity of the stomach, so as to excite that organ, and render it susceptible to the action of the tonic.

A more important benefit to be derived from it is in Cynanche maligna, both as a gargle and as an internal remedy; when used for either purpose, Dr. Chapman (*Elem. Therap.* ii. 144) recommends the following mode, derived from the West Indian physicians, who first introduced the practice. "Infuse two tablespoonfuls of the pepper and a teaspoonful of salt in half a pint of boiling water, adding the same quantity of warm vinegar, and straining when cold; of this, two tablespoonfuls are to be given every half hour." This internal use of Capsicum is also highly praised by many eminent British practitioners. (*Pereira*, ii. 334.) This remedy is, of course, only suited to violent cases. In common sorethroat, and in relaxed conditions of the uvula, the simple infusion has been found beneficial, or else the tincture applied with a soft brush to the parts.

Externally it is used as a cataplasm, or in decoction, for the purpose of causing counter-irritation, and has proved very useful in chronic rheumatism, in the low stages of fever. The cataplasm excites much irritation, but very seldom vesicates, though it is extremely painful. A weak infusion is sometimes of advantage as a stimulant to scrofulous and fistulous ulcerations.

The dose of the powder is 5—10 grains: it is best given in pill; of the tincture ten to sixty drops; of the infusion, made with two drachms of pepper to half a pint of boiling water, the dose is about half an ounce.

As before mentioned, most of the species and varieties are identical in their properties, except as to activity, some being extremely hot and even acrid, whilst others are almost bland; as a general rule, the fruit of *C. frutescens* is more powerful than that of *C. annuum*, and that of *C. baccatum* than either. Another species, the *C. minimum*, is said to be so extremely active as to affect the mouth for days after it has been eaten. Some species,

as the *C. toxicaria*, are stated to be endowed with narcotic properties, but this needs confirmation. (Lindley, *Veg. King.* 621.)

Group XXXI.—Echiales.

Order 77.—BORAGINACEÆ.—*Lindley.*

Calyx 4—5-cleft, persistent. Corolla hypogynous, monopetalous, usually regular, 5-cleft, (sometimes 4-); æstivation imbricate. Stamens inserted on the corolla, equal to the lobes and alternate with them. Ovary 4-parted, 4-seeded, or 2-parted, 4-celled; ovules attached to lowest part of the cavity; style simple, arising from base of ovary; stigma simple or bifid. Nuts 2—4, distinct. Seed separable from pericarp, exalbuminous. Embryo with a superior radicle.

A tolerably extensive order of herbaceous plants or shrubs, with round stems and alternate leaves, which are often covered with hairs arising from a hard base. They are principally natives of temperate regions, especially of the northern hemisphere, almost wanting in the tropics. They are much less abundant in North America than Europe.

Most of the species are possessed of mucilaginous and emollient properties, and contain nitrate of potash, as is shown by their decrepitation when thrown into the fire. They are principally used as demulcents, but some of them afford tinctorial roots. *Cerinthe major* was formerly considered as an astringent, and was used in inflammations of the eyes. (Lemery, *Dict.*) *Onosma echioides*, a native of Europe, affords a red dye from its roots, which is sometimes used as a substitute for Alkanet, especially in the south of France. *Echium vulgare*, indigenous to Europe, and now naturalized in many parts of this country, was formerly considered as an alexipharmic, but has only demulcent qualities; the roots of *E. rubrum* of Asia afford a red dye. Several species of *Pulmonaria* have enjoyed a high reputation in diseases of the pulmonary organs; they are all emollient and demulcent, but not more so than numerous other plants, which have no peculiar virtues attributed to them, and it is most probable, that they owe much of their renown to a lingering reliance on the doctrine of signatures; for as the leaves are spotted somewhat like the lungs, it was supposed that they must of necessity be useful in diseases of those organs; the species most in repute is the *P. officinalis* and its variety *angustifolia*, the former growing upon high mountains, and the latter generally found through Europe, and most frequently used. Our native species, *P. virginica*, is stated to be astringent and demulcent (*Riddell*, 83), and is much used in some parts of the country in catarrhs and other diseases of the respiratory organs. In *Lithospermum*, where the seeds are hard and stonelike, another instance of the influence of the doctrine of signatures is met with, for the species were, at one time, held in great esteem as lithontriptics, and were also considered efficacious in all diseases of the kidneys and bladder. Haller was of opinion, that these plants had some narcotic properties, but this does not seem to be the case.

The species of *Anchusa* are principally valued for their tinctorial powers, but the *A. italica* and *A. officinalis* are also employed as mild sudorifics and demulcents; Ehrenberg, however, says, that in Egypt the first is considered as a specific in jaundice (*Bull. Sci. Med.* xiii. 230), and Meyer reports, that in Siberia the second is regarded as infallible in hydrophobia (*Nouv. Bib. Med.* iii. 443). It may be remarked as a curious fact, that almost all the vaunted specifics in this terrible malady, are plants of the most inefficient character, as the Skullcap, Water-plantain, Pimpernel, and many others. The *A. tinc*

toria furnishes a red dye, which is much used under the name of Alkanet; this colouring matter is thought to be a peculiar principle, and has been named *Pseud-Alkannin* by John. Chevreul has discovered phocenic acid in the root (*Bull. Pharm.* vi. 445). Dr. Hare has proposed an infusion of this root as a substitute for Litmus in testing the presence of acids or alkalies; the phenomena are in a reversed order to those occurring with that substance; the liquid is turned blue by an alkali, and the red colour restored by an acid (*Sill. Jour.* v. 348).

The *Myosotis scorpioides* is stated by Gmelin (*Flor. Sib.* iv. 73), to be used in syphilitic affections in Siberia, and also as a cataplasm in ophthalmia. Lemery (*Dict.* 516) speaks of the roots as astringent and detersive, and efficacious in fistula lachrymalis. It is one of the species of this genus, that is so generally known by the poetic appellation of "*Forget me not.*" *Symphytum officinale*, or Comfrey, is a very popular remedy in diseases of the lungs and bowels; the large succulent roots, which are the parts employed, abound in a tenacious mucilage, with a slight astringency, and hence has been found useful in diarrhœa, dysentery, &c., as a demulcent; and also to replace with advantage the other mild pectorals, in catarrh and pulmonary affections, but possesses no peculiar virtues; at one time it was thought to have great vulnerary powers, and to be capable of arresting hemorrhages, even where a large vessel had been divided, and to cure wounds without leaving any cicatrix. From an analysis by Blondeau and Plisson, its composition appears to resemble very closely that of the Mallow, both containing an acid malate of Altheine (*Jour. de Pharm.* xiii. 635).

The *Borago officinalis* is another plant formerly considered to be endowed with eminent virtues, but now seldom or never used in regular practice, though still maintaining some reputation as a domestic medicine. It was reckoned among the four cordial flowers, hence the old adage, "Ego borago gaudia semper ago," which old Gerarde renders "I borage bring always courage;" the same writer adds, "Those of our time do use the flowers in salads, to exhilarate and make the minde glad. There be also many things made of them, used for the comfort of the heart, to drive away sorrow, and increase the joy of the minde." It is a sudorific and demulcent of very feeble powers, and is very justly forgotten.

Cynoglossum officinale, a native of Europe, and naturalized in some parts of the United States, appears to have more activity than any other plant of the order. It is stated by Vogel and Murray that it is narcotic, and Morison (*Hist. Oxon.* iii. 456), relates a case of poisoning from eating the leaves, and M. Chamberet (*Flor. Med.* iii. 146), declares that he has been affected whilst gathering it; on the other hand, most writers deny that this quality exists in it. The fresh plant is much more active than the dried, and hence some active volatile principle may exist, which is partly destroyed by desiccation. It is considered as anodyne, demulcent and astringent, and has been prescribed in coughs, dysenteries, &c. It is also used as a cataplasm to scrofulous tumours, burns, and even to goitres. Among other virtues attributed to it, are those of an alexipharmic, and of curing hydrophobia. According to an analysis by Cenedilla (*Jour. Pharm. Milan.* 1828), it contains an odorous principle, to which it owes its powers, to tannin and several salts. It is not used in this country, but is probably unjustly neglected, as there is much evidence of its good properties in several diseases. *C. omphalodes* has much the same qualities, and our native *C. amplexicaule* is stated to afford a root which may be used as a substitute for Comfrey.

Order 78.—LAMIACEÆ.—*Lindley.*

Calyx inferior, tubular, persistent, 5—10-toothed, or irregularly bilabiate. Corolla monopetalous, hypogynous, bilabiate, the upper lip undivided or bifid, the lower larger and 3-lobed. Stamens 4, didynamous, inserted on the corolla, alternate with the lobes of the lower lip, 2 upper stamens often abortive; anthers 2-celled. Ovary 4-lobed, placed on a fleshy hypogynous disk, each lobe with a single ovule; style solitary, arising from base of ovary; stigma bifid, usually acute. Fruit 1—4 small nuts or achenia, included in the persistent calyx. Seeds erect, with little or no albumen; embryo erect.

An exceedingly large order of herbaceous or suffruticose plants, with quadrangular stems, and opposite branches and leaves; the latter simple or divided, exstipulate and studded with vesicles, containing an aromatic oil. They principally abound in temperate climates. They are, in all cases, destitute of any poisonous properties, and are generally fragrant and aromatic, and hence are used as stimulants, carminatives, sudorifics, &c., and also as kitchen herbs for flavouring sauces; some few are astringent. A substance resembling camphor is obtained from the volatile oil, afforded by most of the species, but most plentifully from that of Rosemary.

Lavandula.—*Linn.*

Calyx tubular, nearly equal, thirteen or rarely fifteen-ribbed, shortly 5-toothed, with the four lower teeth nearly equal, or the two lower narrower; the upper either but little broader than the lateral ones, or expanded into a lateral appendage. Upper lip of corolla 2-lobed; lower 3-lobed; all the divisions nearly equal. Stamens didynamous, declining. Filaments smooth, distinct, not toothed. Anthers reniform, 1-celled.

A small genus of odoriferous, suffruticose plants, with narrow, rigid leaves, and small whitish flowers; mostly natives of the south of Europe. Several species are employed, and some confusion has existed as regards the nomenclature of the officinal one, as under the name of *L. spica* Linnæus included two plants now considered as distinct species, one with narrow, the other with broader leaves; the first of these is the true *spica* of Linnæus, and the second the *latifolia* of Desfontaines. De Candolle has bestowed on the first the name of *vera*, leaving to the latter that of *spica*, and this view of the subject has been adopted by most late writers on vegetable Materia Medica, with the exception of Merat and De Lens (*Dict. Mat. Med.* iv. 71), who retain the name of *spica* for the narrow-leaved, and give that of *vera* to the broad-leaved. In the following account the views of De Candolle are adopted, though there is much reason to believe that he has given the name of *vera* to the true *spica* of Linnæus.

L. vera, *De Candolle.*—Leaves oblong, linear or lanceolate, quite entire, when young hoary and revolute on the edges. Spikes interrupted. Whorls of six to ten flowers. Floral leaves rhomboid-ovate, acuminate, membranous. Bracts scarcely any.

De Candolle, *Fl. Fr. Sup.* 398; Bentham, *Labiat*, 148; Lindley, *Fl. Med.* 485; *L. spica*, Linn., *Sp. Pl.* 800; Woodville, t. 114; Stephenson and Churchill, i. 40.

Common Name.—Lavander or Lavender.

Foreign Names.—Lavende Commune, *Fr.;* Lavandola, *It.;* Lavandel Blumen, *Ger.*

Description.—Shrubby, much branched, from one to two feet high; bark of the stem

rough and brownish, of the younger branches pale green. The leaves are numerous, linear, hoary, entire, slightly revolute; the upper ones sessile, the lower petiolated. The flowers are in spikes, consisting of interrupted whorls, in which the florets are from six to ten, furnished with small ovate bracts. The corolla is purplish-gray, and consists of a cylindrical tube, divided above into two lips, the uppermost of which is larger and bifid, the lower declining, and of three segments. The stamens are four, with small, simple anthers. The style is slender, and crowned by a bilobate stigma.

Lavender is a native of the south of Europe, but is extensively cultivated in several places in England, and is a common garden plant in this country. It is generally propagated by cuttings. The flowers, which are the officinal portion, are gathered in June and dried in the shade. They have an agreeable fragrant odour, and a pungent bitter taste. They owe their properties to a volatile oil. This, which is obtained by distillation, is of a pale yellow colour, a very pungent taste and fragrant odour. From fifty to seventy pounds of the flowers afford a pound of oil.

Medical Properties.—Stimulant, aromatic and stomachic. The flowers are seldom used except to obtain the oil; this forms the basis of a tincture, much employed as a cordial and anti-emetic, and to relieve colic. The principal use of lavender is as a perfume, especially in the formation of what is termed Lavender water, which is a solution of the oil, either alone or with other aromatics in alcohol.

The *L. stœchas*, has attained some reputation as an antispasmodic, emmenagogue, and expectorant; but is not employed in this country. Its volatile oil is the true oil of spike, and is of a darker colour and less agreeable odour than that of *L. vera*. The *L. spica*, which is the most common species in the south of Europe, furnishes almost all the Oil of Lavender imported from the Mediterranean ports. It has the same properties as that of the *L. vera*, but its fragrance is not as pleasant.

Ainslie, (*Mat. Ind.* ii. 144,) states that the fresh juice of an Indian species, the *L. carnosa*, is employed by the Hindoo practitioners, mixed with sugar candy, in cases of cynanche, and it also enters into the composition of a liniment for the head.

Mentha.—*Linn.*

Calyx campanulate or tubular, 5-toothed, equal or somewhat two-lipped, with the throat naked inside, or villous. Corolla with the tube enclosed, the limb campanulate, nearly equal, 4-cleft; the upper segments broader, nearly entire or emarginate. Stamens 4, equal, erect, distant; filaments smooth, naked; anthers with two parallel cells. Style shortly bifid, with the divisions bearing stigmas. Achenia dry and smooth.

This genus is principally European, but species of it are found in various parts of the world, and several of the European have become naturalized in other countries. They are all herbaceous, and odorous, with verticillate flowers, either axillary or spiked. Several of the species are officinal.

1. M. piperita, *Smith.*—Stem smooth; leaves petiolate, ovate-oblong, acute, serrate, rounded, crenate at base, smooth. Spikes lax, obtuse, short, interrupted at the base. Pedicels and calyx smooth at base, teeth hispid.

Smith, *Eng. Bot.* x. 687; Woodville, ii. t. 120; Stokes, iii. 317; Stephenson and Churchill, i. 45; Bentham, *Labiat.*, t. 687; Lindley, *Flor. Med.* 487.

Common Name.—Peppermint.

Foreign Names.—Menthe poivrée, *Fr.;* Menta pepe, *It.;* Pfeffermünze, *Ger.*

Description.—Rhizome creeping. Stem nearly erect, quadrangular, branched, and usually of a purplish colour, with short recurved hairs, about two feet in height. Leaves opposite, on short petioles, of a dark-green colour, ovate, serrate, acute, smooth, and shining above, and paler beneath; they are never hairy, but the midrib is furnished with short hairs. The flowers are in a terminal, lax, interrupted spike, leafy below. The bracts are lanceolate and fringed. The peduncles are either smooth or slightly hairy above. The calyx is slender, furrowed, and covered with pellucid dots, the base quite smooth, five-cleft, with the segments dark purple and fringed. The corolla is funnel-shaped, longer than the calyx, and of a purplish colour. The stamens are subulate, straight. The ovary is four-lobed, superior, supporting a slender style, longer than the corolla, and terminated by a bifid stigma.

Peppermint is a native of Europe, and has become naturalized in some places in this country; it grows in wet places, flowering the latter part of the summer. There are several varieties of it, and Sir J. E. Smith states that what is called Peppermint in the north of Europe, is merely a variety of *M. hirsuta*, having a similar odour, and is the *M. piperita* of the Linnæan Herbarium. The whole plant is officinal. It has a peculiar and well-known aromatic odour, and a pungent, somewhat bitter taste, followed by a sensation of coolness. It gives out its properties to alcohol, and partly to water. It contains Volatile oil, a Bitter principle, Resin, &c.

The Volatile oil on which its properties depend is colourless, but becomes yellowish or even reddish by age. Its specific gravity is 0·902. It has a powerful aromatic odour, and an extremely pungent taste. The camphor it contains is isomeric with the oil.

Medical Properties.—Aromatic, carminative, and stimulant. It is much used to expel flatus, to obviate nausea, relieve pain in the bowels, and to disguise the unpleasant taste of other medicines. The usual form of administration is in the form of the Essence, which is a solution of a drachm of the oil, in an ounce of alcohol. The plant is also used in infusion.

2. M. VIRIDIS, *Linn.*—Spikes cylindrical, interrupted. Leaves sessile, lanceolate, acute, naked. Bracts bristle-like, somewhat hairy, as well as the teeth of the calyx. Stem smooth.

Linn., *Sp. Pl.* 804; *Eng. Bot.* xxxiv. 2424; Woodville, ii. t. 121; Stokes, 311; Stephenson and Churchill, i. 45; Bentham, *Labiat.*, 173; Lindley, *Flor. Med.* 486.

Common Names.—Mint; Spearmint; Green mint.

Foreign Names.—Menthe verte, *Fr.;* Menta Romana, *It.;* Frahenmunze, *Ger.*

Description.—Rhizome creeping. Stem erect, branched, acutely-angular, smooth, sometimes purplish, from two to three feet high. The leaves are of a bright-green colour, lanceolate, nearly sessile, opposite, and sometimes a little hairy beneath. The stems and branches are terminated by long spikes of verticillate flowers, the whorls of which are somewhat distant, and furnished with narrow, lanceolate bracts; the pedicels are smooth. The calyx is campanulate, usually smooth, with five equal teeth, and sprinkled, equally with the leaves, with minute dots. The corolla is funnel-shaped, smooth, of a light-purple colour; the stamens are generally shorter than the corolla, with roundish anthers. The ovary is four-lobed, with a filiform style, having a bifid stigma. The seeds are four, small, and often abortive.

Spearmint is a native of Europe and is extensively naturalized in many parts of the United States, growing in moist situations. The whole plant is employed; it has a peculiar and pleasant odour, which is not as powerful as that of Peppermint; the taste is aromatic and slightly bitter. Its properties depend on a Volatile oil, besides which it contains a Bitter extractive. The oil is of a pale yellowish colour, becoming darker by age.

Medical Properties.—The same as those of Peppermint, but not as powerful, but from its taste being more agreeable to most persons, it is more frequently employed as a flavouring ingredient. The infusion of the dried herb is often used to obviate nausea. This species is more employed as a sauce and to give flavour to drinks, than as a medicine.

There are numerous other species of Mint, used to fulfil the same indications as those above-mentioned, among which the *M. pulegium* or European Pennyroyal, has obtained some celebrity as a carminative, and popularly as an antispasmodic and emmenagogue, the latter of which powers it does not possess in any greater degree than any other warm stimulant. The *M. sativa*, *M. aquatica*, and *M. rotundifolia*, are often used as substitutes for the above in Europe, and have the same properties. The species peculiar to the United States are seldom employed, as both their odour and taste are not as aromatic and pleasant as the naturalized.

Lycopus.—*Linn.*

Calyx tubular, 5-cleft or 5-toothed. Corolla tubular, 4-cleft, nearly equal; upper division broader and emarginate. Stamens distant. Seeds four, retuse.

Mostly a North American genus, of small, herbaceous plants, with small, axillary, crowded, verticillate, sessile, and generally bi-bracteate flowers, and deeply-toothed or sinuated leaves. The flowers are diandrous; but in the *L. vulgaris* there are rudiments of two additional abortive stamens. All the species grow in moist situations, and appear to be the most tonic and best stimulating of the labiate plants.

L. virginicus, *Linn.*—Stem simple. Angles obtuse. Leaves broad, lanceolate, serrate. Base alternated, entire, surface rugose, dotted beneath. Calyx 4-cleft, shorter than the seeds.

Linn., *Sp. Pl.* 121; Pursh, i. 16; Elliott, *Sket.* i. 25; Rafinesque, *Med. Fl.* ii. 26; Bentham, *Labiat.*, 186; Lindley, *Flor. Med.* 488.

Common Names.—Bugle-weed; Water Horehound.

Description.—Root perennial, fibrous. Stem erect, herbaceous, with four obtuse angles, furrowed, somewhat pubescent, simple or branched, from one to two feet high. Leaves opposite, sessile, acuminate, somewhat rough, with glandular dots beneath. Flowers in sessile, axillary whorls, with two subulate bracts at the base of each flower. Calyx 4-cleft, shorter than the seeds, persistent. Corolla white, twice as long as the calyx, the emarginate segment broader than the others. Stamens two, as long as the corolla, inserted on the tube near the base of the upper segment. Anthers erect, 2-lobed, pale purple. Ovary superior, quadrangular, somewhat furrowed, with a filiform style, somewhat exserted, and terminated by a 2-cleft stigma, the lobes of which are acute. Seeds four, longer than the calyx, obovate, compressed, and crenate at top.

The Bugle-weed is abundant in most parts of the United States, in moist situations; it flowers in July and August. The whole plant is officinal. It has a peculiar, but somewhat aromatic odour, and a disagreeable, bitter taste, imparting these properties to water. No analysis has been made of it, but it is probable that its powers in a great measure depend on a peculiar essential oil; though, from the general effects of the herb on the system, it is evident that some other active constituents are present.

Medical Properties.—Its operation as a remedial agent is not fully understood; Dr. A. W. Ives considers it to be mildly narcotic, but it is also tonic and astringent. It was brought into notice by Drs. Pendleton and Rogers

of New York (*N. York Med. and Phys. Jour.* i. 179), and is highly spoken of by many practitioners as beneficial in pulmonary affections, from its diminishing the frequency of the pulse, allaying irritation and preventing cough. It acts like a mild narcotic, and at the same time displays tonic powers. Those practitioners who have employed it are unanimous in declaring that it is an exceedingly valuable addition to the Materia Medica. It appears to act like Digitalis in abating the frequency of the pulse, but its use is not attended with the appearance of those unpleasant symptoms so often attendant on the administration of that article. Should what is said of its sedative powers prove correct, on further trials of it, it is certainly a most important remedy, and one that should be more extensively employed. It requires a thorough and fair trial.

It is usually given in infusion, but has also been administered in powder, or even in syrup.

A European species, the *L. Europæus*, but naturalized in the United States, has long been employed in Europe as a febrifuge, and in Piedmont is known under the name of *Erba china*. Professor Ré of Turin, in a memoir on the subject, declares that in doses of two drachms of the dried plant, the most obstinate intermittents were removed. It has also some astringent powers, according to Dr. Brofferio. (*Repert. Med. Chir.* Turin.)

Fig. 219.

L. virginicus.

Salvia.—*Linn.*

Calyx sub-campanulate, striate, bilabiate, upper lobe 3-toothed, lower bifid. Corolla, margin bilabiate, upper lip arched and emarginate, lower 3-lobed, the intermediate one largest and rounded. Stamens two, fertile, transversely pedicellate. Anthers 1-celled, one of which is sterile.

A numerous genus, the species of which are found in all parts of the world, but most common in warm climates; they are herbaceous or suffruticose, with opposite, usually dentate, or deeply-divided leaves, and often large and brilliantly-coloured flowers, having one to three bracts or axillary leaves.

S. officinalis, *Linn.*—Leaves ovate-lanceolate, entire, tomentose beneath. Flowers in spines. Calyx-teeth subulate, acuminate.

Linn., *Sp. Pl.*, 34; Woodville, ii. t. 127; *Flore Med.* vi. t. 313; Bentham, *Labiat.* 209; Lindley, *Flor. Med.* 489.

Common Names.—Sage; Garden Sage.

Foreign Names.—Sauge, *Fr.*; Salvia, *It.*; Salvey, *Ger.*

Description.—Perennial, shrubby, about two feet high, with a quadrangular, pubescent stem, having ovate-lanceolate, crenulate, wrinkled, petiolate leaves, of a grayish-green

colour, sometimes tinged with red or purple. The flowers are in long, terminal spikes, composed of distant whorls, with ovate, acute, caducous bracts. The calyx is tubular and striated, bilabiate; the upper lip 3-toothed, and the lower one bifid. The corolla is of a blue colour, tubular, ringent, bilabiate; the upper lip being arched and concave, and the lower one divided into three lobes, of which the outer ones are the smallest. The stamens are affixed to short pedicels transversely about their middle.

The Sage is indigenous to the south of Europe, and is extensively cultivated in gardens both in Europe and this country. There are numerous varieties, differing in the colour of their leaves and flowers, but apparently identical in their qualities. This plant flowers in June, at which time the leaves, which are the officinal portion, should be collected. It has been celebrated from the earliest ages, and is spoken of in terms of praise by all the ancient writers on medicine; by the Romans, it was termed the *Herba sacra*, and the school of Salernum considered it as the best remedy for prolonging life: "Cur moriatur homo cui salvia crescit in horto." Even in more modern times, it was still thought to be endowed with high powers, and was arranged among the heroic remedies.

It has an aromatic, but very peculiar odour, and a warm, bitterish, aromatic, and somewhat astringent taste, which it owes to the presence of an abundance of volatile oil, which may be obtained by distillation. This oil contains much camphor.

Medical Uses.—Sage is principally employed as a condiment, but is also in frequent use, in the form of infusion, as a gargle in sore throat and relaxed uvula; for these purposes the infusion is usually employed, in combination with vinegar, or honey and alum. The infusion is also given in a warm state, as a sudorific. At one time it was considered as a powerful antispasmodic, and as exercising a marked action on the brain; but more modern experience has shown that its powers in these respects are very feeble. Van Swieten states that a vinous infusion of it is an excellent fomentation to arrest the flow of milk to the breasts of nurses who are weaning children. It is even considered by Aetius (*Tetrab.* i.) as capable of rendering women fertile, and of facilitating parturition, with many other marvellous properties.

It is stated by Bomare that it was exported by the Dutch to China, and was so much preferred by the inhabitants of that country to their own tea, that they willingly exchanged two boxes of theirs for one of the European, but this account has not been confirmed by other writers.

The essential oil has been administered internally as a carminative and stimulant, and employed externally as a friction in rheumatism, paralysis, &c.

Numerous other species of this genus have somewhat the same properties as the *S. officinalis*. Among these may be noticed *S. sclarea*, also a native of Europe, especially in the southern parts. It has an agreeable smell, which has been compared to that of Balsam of Tolu and the Pine apple, and hence is used to aromatise jellies, &c. It is said to be antispasmodic and balsamic, and is used for the same purposes as the common sage, and also in hysteric affections. It also had some reputation especially in nebulosities of the cornea. Ettmuller says, that infused in wine, it gives it a muscat odour, and renders it more intoxicating. It is asserted (*Journ. Pharm.* vi. 316) that it contains benzoates. *S. bengalensis* is used in India as a substitute for the common Sage, from which it differs only in having a highly camphorated smell. (*Ainslie*, i. 359.) *S. pomifera*, a native of Greece, derives its name from the leaves bearing small round excrescences, caused by the puncture of an insect; Olivier says that these balls are made into a pleasant sweetmeat by cooking them with honey and sugar. Belon thus describes them as occurring at Mount Ida: "Il croist des saugers qui portent des pommes bonnes à manger; desquelles les paysans remplissent leurs sacs, qu'ils

chargent à leur col pour les porter vendre aux villes prochaines. Ils les trouvent attachées aux feuilles au commencement du mois de May. Elles sont grosses comme une galle, convertes de poil par dessus et sont douces et plaisantes à manger."

Another species of Southern Europe, the *S. horminum*, is reputed to be aphrodisiac, and beneficial in affections of the eyes. It is mentioned by both Dioscorides and Pliny. The Peruvians make use of an infusion of *S. integrifolia* in pleurisy (*Flor. Peruv.*); and the *S. leucantha* is esteemed as a sudorific in the West Indies (*Flor. Med. Antill.* iii. 303).

Rosmarinus.—*Linn.*

Calyx ovate-campanulate, two-lipped; the upper one entire, the lower bifid. Corolla with the tube smooth, not ringed within, somewhat inflated in the throat; limb bilabiate; lips nearly equal, the upper one erect and emarginate, the lower spreading, trifid, with the lateral lobes erect, but somewhat twisted; the middle one large, declining. Stamens 2, ascending, inferior, exserted; no rudiments of superior stamens; filaments toothed at base, anthers linear, sub-two-celled. Upper lobe of the style very short; stigmas minute, terminal.

There is only one species in this genus, though there are several marked varieties. It was well known to the ancients, by whom it was called *Coronarius*, from being used in garlands, and *Thuribulum* or Small frankincense. Pliny first applied the name of *Rosmarinum* to it.

R. officinalis, *Linn.*—The only species.

Linn., *Sp. Pl.* 23; Stephenson and Churchill, i. 24; *Flor. Med.* vi. 300; Bentham, *Labiat.*, 315; Lindley, *Flor. Med.* 489.

Common Name.—Rosemary.

Foreign Names.—Rosmarin, *Fr.;* Rosmarino, *It.;* Rosmarin, *Ger.*

Description.—Perennial, evergreen, shrubby, two or three feet high, much branched, downy, and thickly furnished with leaves; these are opposite, sessile, linear, dark-green, smooth, shining above, with the margins reflected, and whitish tomentose beneath. The flowers are pedunculated, of a pale-bluish colour, variegated with white and purple, and exhale, like the leaves, a fragrant camphoraceous odour. The calyx is campanulate and villous; the corolla is ringent, longer than the calyx, with the upper lip erect and bifid; the lower divided into three segments, the middle one of which is largest, concave and emarginate. The stamens are two, longer than the corolla, curved and furnished with a minute tooth, near the base; the anthers are oblong and of a blue colour. The style is as long as the stamens, curved and furnished with pointed stigmas. The seeds are four, naked and situated at the base of the calyx.

It is a native of the south of Europe, especially near the seacoast, and is cultivated in gardens in England and this country; it flowers in June. The flowers of the plant, in a wild state, are said to be larger, and the leaves broader than in the cultivated variety. Two other kinds are also occasionally met with in gardens, one with white-striped leaves, called *Silver rosemary;* the other with yellow stripes, and denominated *Golden rosemary*. The ancients supposed that this plant had the power of imparting strength to the memory and of comforting the brain, and these properties are frequently referred to by the older poets; and from the same belief it was worn at weddings, and used at funerals; though its latter employment has been supposed by some to be a precaution against contagion.

The officinal portions are the flowering tops. These have a fragrant odour, and a bitter pungent taste. When distilled with water, they afford a light, pale volatile oil, of great fragrancy, but not as agreeable as that of the fresh plant. One pound of the herb furnishes about a drachm of the oil. On being kept for some time it deposits crystals of camphor.

Medical Properties.—Rosemary is stimulant and carminative, but is rarely employed medicinally. It was formerly in some esteem for its supposed virtues in hysteria, in uterine obstructions, and nervous complaints, but is now mainly used as a perfume, especially in combination with other aromatics; though it also is employed as an odoriferous addition to various lotions and liniments.

Hedeoma.—*Persoon.*

Calyx bilabiate, gibbous at base, upper lip 3-toothed, lower 2; dentures all subulate. Corolla ringent. Stamens 4, didynamous; 2 fertile, as long as corolla, 2 sterile, short.

The species composing this genus, which are mostly North American, were included by Linnæus in *Cunila* and *Melissa*, but were separated by Persoon, and now constitute a small but well-marked group. They are all small and herbaceous, with opposite leaves, and verticillate, bracteate flowers. One species only is officinal.

H. pulegioides, *Persoon.*—Pubescent. Leaves oblong-lanceolate, serrated, a little rough. Flowers in axillary verticilli, on short pedicels.

Persoon, *Synop.*, ii. 131; Nuttall, *Gen.*, i. 116; Barton, *Veg. Mat. Med.*, ii. 165; Rafinesque, *Med. Fl.*, i. 231; Bentham, *Labiat.* 366; Lindley, *Flor. Med.* 491.

Common Names.—Pennyroyal; Tick Weed; Squaw Mint.

Fig. 220.

H. pulegioides.

Description.—Annual. Stem upright, much branched, about a foot high, somewhat angular, pubescent. Leaves opposite, small, lanceolate-oblong, or ovate, narrowed at base, margin sparsely dentated, rough, pubescent, pale beneath, shortly petiolated. The flowers are in axillary whorls of about six, very small, pale-blue, on short pedicels. Calyx striated and pubescent, bilabiate, the upper lip divided into two ciliated segments, the lower into three rounded lobes. The stamens and style are filiform. The seeds are four, oblong, contained in the persistent calyx, the mouth of which is closed by bristles of the lower lip.

The Pennyroyal is abundant in most parts of the United States, in dry, sterile situations, and is especially abundant in calcareous soils. It begins to blossom in July, and continues to flower until late in the autumn. The whole plant is officinal. It has a powerful aromatic odour, which is extremely pleasant to some persons, but offensive to others. The taste is

very pungent. It owes its properties to an essential oil, and imparts its virtues to boiling water. The oil is of a light-yellow colour, with a specific gravity of 0·948.

Medical Properties.—Pennyroyal is a stimulant aromatic, and is used to obviate nausea and relieve flatulence, as well as to disguise the taste of nauseous medicines. No one of the aromatic herbs is more employed in domestic practice than this, especially as an emmenagogue, and with more general success. It is given in warm infusion, and, aided by a hot foot-bath, acts very beneficially in slight cases of suppressed or scanty menstruation, though no dependence is to be placed upon it in those of long standing. It is also used with some benefit as a stimulating diaphoretic, in incipient catarrhs and rheumatisms. It is said that the plant or its oil is an effectual remedy against the attacks of ticks, fleas, and musquitoes; but, from many trials made with it, it does not appear to possess any more effect than the other aromatics.

Cunila.—*Linn.*

Calyx tubular, striated, 5-toothed, subequal. Corolla tubular, ringent, bilabiate; upper lip erect, flat, emarginate; lower lip 3-parted. Stamens 4; 2 fertile, exserted, 2 sterile, short. Anthers didymous, roundish. Ovary 4-lobed. Style filiform, with a bifid stigma. Seeds 4, egg-shaped, small.

A North American genus, containing but few species, all aromatic and stimulant. Under this name Pliny speaks of several plants, differing widely from each other in botanical character and physical properties; thus his *C. sativa* is a *Satureja*, and his *C. mascula* an *Inula*.

C. mariana, *Linn.*—Smooth; stems slender and branched. Leaves opposite, sessile, ovate, serrate, punctate. Flowers in terminal corymbs.

Linn., *Sp. Pl.* 30; Stokes, *Bot. Mat. Med.* i. 43; Barton, *Veg. Mat. Med.* ii. 171; Rafinesque, *Med. Fl.* i. 136; Bentham, *Labiat.*

Common Names.—Dittany; Mountain Dittany; Stone-mint, &c.

Description.—Root perennial, fibrous. Stem smooth, slender, about a foot high. Branches opposite or nearly so. Leaves opposite, sessile, smooth, punctate, cordate at base,

Fig. 221.

C. mariana.

of a dry texture, pale-green above, glaucous beneath; margin waved, with small, acute serratures. The flowers are numerous, in terminal and sometimes axillary dichotomous corymbs, of a bluish-purple colour (sometimes white). Each flower is pedunculate. The calyx is green, with ten longitudinal striæ, and five nearly equal, sharp teeth. The corolla is twice as long as the calyx, bilabiate; lower lip largest, with three rounded lobes; upper lip flat and emarginate. The stamens are four; two of them long, slender, and exserted, bearing small, didymous anthers; the two others sterile, very short. The stigma is bifid, exserted. The seeds are four, small, obovate, at the base of the persistent calyx, the mouth of which is closed by rigid hairs.

The Dittany is found in dry soils, in shady and hilly woods, in most parts of the United States, flowering from July to the last of September. The whole plant is used. It has a warm, pungent taste, and a powerful, aromatic smell, depending, as in the other plants of its order, on the presence of a volatile oil. This oil is not officinal, but is very powerful, resembling that of Monarda.

Medical Properties.—These are stimulant, carminative, and aromatic, as in the other labiate plants. It appears to have been employed by the Indians, and is noticed by Schoepf as stimulant and nervine, and useful in intermittent fevers, and the expressed juice, mixed with milk, as an antidote to the bites of venomous snakes. It is much employed in domestic practice as a sudorific, given in warm infusion; and, like all the stimulating teas, has obtained some reputation as an emmenagogue. It may be used wherever a warm, stimulating aromatic is required.

Monarda.—*Linn.*

Calyx tubular, 5-toothed. Corolla ringent, with a long tube; upper lip linear, involving the filaments; lower lip 3-parted, reflexed. Stamens 2, long, exserted. Style 1, with a lateral stigma.

This beautiful genus is peculiar to North America, and is named in honour of Monardes, a French botanist. The species are herbaceous, having axillary, verticillate, or terminal and capitate flowers, with involucrate bracts, which are sometimes highly coloured. They are all very aromatic, and abound in volatile oil, though only one species is officinal, the *M. punctata*, which is very powerful, but has the least agreeable aroma.

M. punctata.—Somewhat smooth. Flowers verticillate. Bracts lanceolate, coloured, longer than the flowers. Leaves lanceolate-oblong, remotely serrate. Stem obtuse-angled, tomentose.

Linn., *Sp. Pl.* 126; Elliott, *Sketches*, i. 30; Torrey, *Comp.* 23; Atlee, *Am. Med. Recor.* ii. 496.

Common Names.—Horsemint; Rignum, &c.

Description.—Stem about two to three feet high, obtusely 4-angled, whitish, downy stems. Leaves oblong-lanceolate, remotely serrate, smooth, punctate, tapering to a short petiole. Flowers in numerous whorls, having lanceolate, coloured bracts, longer than the whorls. The corolla is yellow, spotted with brown; the upper lip somewhat vaulted, containing the filaments, the lower shorter, and 3-cleft.

It is found in light and sandy soils, from New Jersey to Florida, flowering from June to September. The whole plant has an aromatic smell, and a warm, pungent, somewhat bitter taste, and abounds in a powerful volatile oil. This is usually distilled from the fresh herb. It is of a reddish-yellow or brownish colour, of a strong, aromatic odour, and a warm and exceedingly pungent taste. When applied to the skin, it produces redness and pain, and in some cases vesication.

Medical Uses.—Horsemint, like most of the articles of its order, is stimulant and carminative. It is used in infusion for flatulent colic and other cases requiring the employment of an exciting carminative. Elliott states that the root has some reputation in domestic practice as an emmenagogue, for which purpose it is given in a warm infusion. The volatile oil forms a most efficacious rubefacient and counter-irritant, and is much used where such an application is required. Dr. Atlee, who experimented much with it, found it very beneficial as a liniment in chronic rheumatism, the low forms of fever, neuralgic pains, &c.; and it has proved very useful in the hands of other practitioners. Where the skin is tender, as in females and children, the oil should be diluted. It may be given internally as a carminative, in doses of two drops, on sugar.

Origanum.—*Linn.*

Calyx ovate, tubular, ten to thirteen-nerved, striated, with 5 sub-equal teeth; throat villous within, upper limb of corolla nearly erect, emarginate; the lower spreading, 3-parted. Stamens four, exserted, didynamous, the lower ones longer. Style bifid at the point. Achenia dry, somewhat smooth.

A small genus, almost peculiar to the countries bordering on the Levant, though some of the species are widely diffused throughout the world. They are herbaceous, with flowers on axillary and terminal peduncles, each supporting several spikes, and each flower separated from the others by broad bracts. One species is officinal.

O. vulgare, *Linn.*—Erect, villous. Leaves petiolate, broad-ovate, obtuse, subserrate, rounded at the base, green on both sides. Spikes roundish, oblong, panicled, fasciculate; bracts ovate, longer than the calyx.

Linn., *Sp. Pl.* 834; Torrey, *Comp.* 236; Woodville, t. 124; Lindley, *Flor. Med.* 490; Stephenson and Churchill, iii. 131.

Common Name.—Common Marjoram.

Foreign Names.—Origan, *Fr.;* Origano, *It.;* Gemeine Dosten, *Ger.*

This plant is a native of many parts of Europe; it is also found in Asia, and has been extensively naturalized in this country. It is generally found in dry, gravelly, or calcareous soils, and flowers from June to September. The whole plant is officinal, but is principally used for the extraction of the oil. This, when first obtained, is of a yellowish colour, but becomes red by age. It has the odour of the plant, and a very hot, pungent taste. Its specific gravity is 0·909. The proportion of oil obtained by distillation varies much, but the average product is half a pound from a hundred weight.

Medical Properties.—The marjoram resembles the other labiate plants in its remedial qualities, being mildly stimulant and carminative, but is seldom employed. It formerly was held in high estimation as an emmenagogue, and the warm infusion is sometimes used as a diaphoretic. The essential oil is applied to carious teeth, to relieve pain, and enters into the composition of stimulating liniments, for the cure of sprains, rheumatism, &c.

The Sweet Marjoram, which now forms the type of the genus *Marjorana*, is principally used for culinary purposes, to give flavour to soups, &c., but at one time was much esteemed as a popular remedy in nervous complaints, and Murray (*Appar. Medicam.*) states, that the fresh herb applied to painful scirrhous tumours of the breast has removed them. It is supposed that the *O. creticum* is the plant mentioned by Dioscorides, but it is also stated that both it and the *Amaracum* of Pliny, refer to the *O. dictamnus*, now the type of *Amaracus*, Bentham.

Nepeta.—*Linn.*

Calyx dry, striated. Tube of the corolla longish; intermediate lobe of the lower lip crenate; margin of the orifice reflected. Stamens approximate.

A large genus, diffused throughout the world, but principally found in the south of Europe, the countries bordering on the Mediterranean, Persia, and India. They are herbaceous, with verticillately spiked flowers, rarely racemose, or cymose. One species only is employed.

N. cataria, *Linn.*—Flowers spiked; whorls slightly pedunculated; leaves petiolate, cordate, dentate, serrate.

Linn., *Sp. Pl.* 797; Torrey, *Comp.* 233; *Flor. Med.* ii. 105; *Engl. Bot.* 137; Lindley, *Flor. Med.* 492.

Common Names.—Catnep; Catmint.

Foreign Names.—Cataire, Herbe aux chats, *Fr.;* Erba gattaria, *It.*

Catnep is a native of many parts of Europe, and is abundantly naturalized in this country; it grows in neglected, dry situations, flowering in June and July. The whole plant is used; it has a strong, peculiar, and even unpleasant odour, and a bitter, somewhat aromatic taste. Like Valerian, it appears to be extremely agreeable to cats, who delight in rolling on it, so as to develope the odour, which is said to act on them as an aphrodisiac. Ray states, that when this plant is raised from seed, instead of being transplanted, that these animals will not touch it.

Medical Properties.—It is much employed, in domestic practice, as a carminative, especially in colic of infants, in the form of infusion. It possesses the usual properties of its class, and moreover, is endowed with marked antispasmodic powers, a strong infusion oftentimes acting very efficaciously in attacks of hysteria. Many European writers speak of it in high terms in the treatment of chlorosis, and amenorrhea, and it is also said to operate as a powerful vermifuge. It is now seldom employed in regular practice, but is far more deserving of notice than many articles admitted into the officinal lists.

Several other species are employed medicinally, among which may be mentioned the *N. citriodora*, which, according to Wiegmann, is a powerful emmenagogue (*Bull. Sci. Med.* x. 171); the *N. madagascariensis* furnishes tuberous roots, which are eaten in Madagascar; and the *N. malabarica*, the leaves of which, according to Ainslie (*Mat. Ind.* ii. 295), are given in India in stomachic complaints, and in the later stages of dysentery, and also in intermittent fevers, and the expressed juice is prescribed for children in the febrile condition attending teething; and Rumphius (*Amboin.*, v. c. 75) states, that the juice mixed with oil of sesamum is much used by the Malays in chronic coughs and asthma.

Marrubium.—*Linn.*

Calyx tubular, five to ten-nerved, equal, with five to ten bristly teeth. Corolla with the upper lip erect, the lower spreading and trifid, the middle lobe broadest. Stamens four, didynamous, included, anthers with divaricating, somewhat confluent lobes. Style with short, obtuse lobes.

A small genus, principally indigenous to the south of Europe, and countries bordering on the Levant. The flowers are verticillate and sessile, with numerous linear bracts. The leaves are generally whitish and rugosely-veined. One species is officinal.

M. VULGARE, *Linn.*—Branches white-woolly. Leaves roundish-ovate, wrinkled, crenate, softly villous. Whorls many-flowered. Calyx woolly, with ten bristly, recurved teeth.

Linn., *Sp. Pl.* 816; Torrey, *Comp.* 235; Lindley, *Flor. Med.* 494; Stephenson and Churchill, iii. 135.

Common Names.—Horehound; White Horehound.

Foreign Names.—Marrube blanc, *Fr.;* Marrobio bianco, *It.;* Witte malrove, *Ger.*

The Horehound is a native of most parts of Europe; is also found in Asia, and has become naturalized in some places in the United States. It grows in waste grounds and among rubbish, especially in warm, dry situations, flowering in July and August. The whole plant is officinal. It has a strong and peculiar aromatic odour, and a bitter, somewhat pungent taste, which is very permanent. According to an analysis by Mr. M'Maken (*Am. Jour. Pharm.* xi. 1), it contains Resin, Tannic acid, Volatile oil, a peculiar crystallizable Bitter principle, &c. This bitter principle is insoluble in water, but soluble in ether, and more so in hot than in cold alcohol, is perfectly neutral, and melts like resin when heated.

Medical Properties.—Horehound is tonic, somewhat stimulant and diuretic, and in large doses is gently laxative. It was at one time in much repute in asthma, jaundice, and visceral and uterine obstructions. It is seldom employed at the present day in regular practice, but is a favourite domestic remedy in diseases of the pulmonary organs, and some cases of obstinate catarrhs have been much benefited by the expressed juice taken in milk. It is administered in powder, in doses of about a drachm, but more frequently in infusion made with an ounce of the dried herb to a pint of boiling water, and given in doses of a wineglassful several times a day. It also enters into the composition of several cough syrups and candies.

COLLINSONIA.—*Linn.*

Calyx bilabiate; upper lip three-toothed, lower bifid. Corolla much longer than the calyx, somewhat infundibuliform, unequally 5-lobed; the lower lobe longest, fimbriated. Stamens 4, two of which are often sterile. Seeds 4, often 2—3 abortive.

A small North American genus of herbaceous plants, with large opposite leaves, and flowers in terminal panicles of a yellowish-violet colour. It was named by Linnæus, in honour of Peter Collinson, so advantageously known for his zeal and liberality in the promotion of science and learning in the then British Colonies. This genus is sometimes diandrous and sometimes tetrandrous, but in all the species the fertile stamens are exserted.

C. CANADENSIS, *Linn.*—Leaves broad, cordate, ovate, smooth. Teeth of the calyx short, subulate. Panicle compound, terminal.

Linn., *Sp. Pl.*, 40; Torrey, *Compend.*, 24; Rafinesque, *Med. Fl.* i. iii. t. 23.

Common Names.—Horse-weed; Rich-weed; Knot-weed; Heal-all, &c.

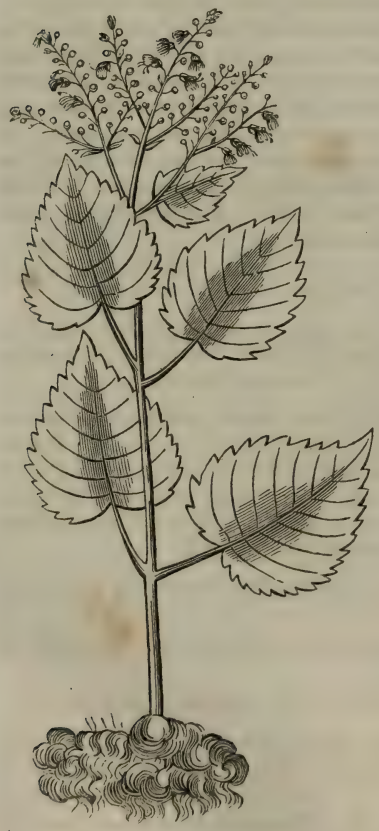
It is found in many parts of the United States, between the Atlantic and the mountains, but is more rare in the Southern States; very frequent in rich valleys in New York and Pennsylvania. It flowers from July to September, and is a curious and rather handsome plant. The whole plant has a peculiar balsamic smell, which is milder and pleasanter in the flowers than in the root, this having somewhat a rank odour. It affords on distillation an essential oil, which possesses the same odour. The taste of both is pungent and warm. No analysis has been made of it.

Medical Uses.—It was in use among the Indians as a vulnerary at the time of the discovery, and is still used for this purpose in domestic practice in some parts of the country, being considered as efficacious in all kinds of wounds and bruises, and is taken in the form of an infusion for headache, colic, indigestion, &c., and hence has received the common name of Heal-all.

Schoepf was the first writer who noticed it; he says it is beneficial in ague, snake-bites, and colic, and externally as a friction in rheumatism. Dr. Mease (*Domest. Ency.*, ii. 177), states that an infusion of the root in cider, has proved perfectly successful in several cases of dropsy.

The best detailed account of the properties of this plant was given by Dr. C. Hooker, of New Haven (*Annal. Soc. Lin. Par.*), but Dr. French of Milford in Connecticut, appears to have been the first practitioner who employed it in diseases of the urinary organs, and was extremely successful with it, and its efficacy in such cases is corroborated by Dr. Hooker and Dr. Biers; the latter gave the powdered root in spoonful doses, but found that he was often obliged to suspend its use from the occurrence of irritation of the stomach; he also found it of service in ovarian dropsy and ascites. Dr. Hooker is of opinion that the active principle is volatile, and that the most advantageous mode of administration is the infusion, which should be made in a close vessel, and by a very gentle heat. The powdered root soon loses all power, and even when kept in an entire form cannot be depended upon, if kept for any time. It appears probable that the best preparation would be the essential oil, though the tincture might perhaps retain all the virtues of the recent plant.

Fig. 222.



C. canadensis.

It is also said to be an excellent tonic, and has been given with benefit in low fevers, exhaustion of the forces, and leucorrhœa. From all that can be learnt respecting it, there is no doubt that it is an active medicine, and one that deserves attention.

All the other species have the same smell, taste, and properties. The odour of the *C. anisata* is somewhat similar to that of aniseed. They have a close resemblance to each other, but present sufficient specific distinctions to be recognised by an experienced eye.

Numerous other plants of this order have been, and are still employed as stimulants, carminatives, &c., but it would only be encumbering the pages of this work to notice them except in the most cursory manner. Most of the species of *Ocymum* are stomachic, but some of them, as *O. viride* and *O. sanctum*, are reported to be febrifugic, and *O. cavum* and *O. crispum* to be sudorific. *Meriandra bengalensis* much resembles Sage in its

properties, but is more powerful. *Rosmarinus officinalis* is principally employed as a perfume; it is said to encourage the growth and vigour of the hair, and it is stated an infusion of it will prevent it from uncurling in damp weather. *Amaracus dictamnus* is the celebrated Dittany of Crete, in so much repute among the ancients as a vulnerary. *Leonurus cardiaca* is a supposed tonic, and has been said to relieve palpitation of the heart; it has also been extolled in Russia as a preservative against hydrophobia; for which purpose *Scutellaria lateriflora* obtained an undue reputation in this country, but it is more than probable that neither has any efficacy in this malady. *Stachys betonica* when powdered, causes sneezing, from the fine rigid hairs with which it is covered. The root is said to be purgative and emetic.

Group XXXII.—Bignoniales.

Order 79.—PEDALIACEÆ.—*Lindley.*

Calyx formed of 5 nearly equal pieces. Corolla monopetalous, irregular; the throat ventricose; the limb bilabiate. Lobes somewhat valvate in æstivation. Disk hypogynous, fleshy, sometimes glandular. Stamens didynamous, included, with the rudiment of a fifth. Anthers 2-celled; the connective articulated with the filament, somewhat prolonged beyond the cells, terminated by a gland. Ovary on a glandular disk, 1-celled, sometimes divided into 4 or 6 spurious cells, by the splitting of two placentas, and the divergence of their lobes. Ovules anatropal, erect or pendulous, or horizontal, solitary, or 2 or several. Style 1. Stigma divided. Fruit drupaceous or capsular, valvular or indehiscent, 2—6-celled; usually few-seeded when numerous, or many-seeded when two. Seeds wingless, exalbuminous. Embryo straight.

Herbaceous plants usually with a heavy smell, covered with glandular hairs, or with vesicles. Leaves opposite or alternate, undivided and exstipulate. They are principally natives of the tropics. Many of them have mucilaginous leaves, and oily seeds.

Sesamum.—*Linn.*

Calyx 5-parted, persistent; upper lobe the smallest. Tube of the corolla large, limb plicate, somewhat bilabiate; upper lobe emarginate, lower slightly trifid. Stamens 4, didynamous, with the rudiment of a fifth. Anthers ovate-oblong. Stigma bi-lamellate. Capsule oblong, obtusely 4-angled, 4-grooved, 2-celled, 2-valved, valves recurved. Seeds numerous, thick, apterous.

A small genus of East Indian herbaceous plants, with opposite, petiolate leaves, entire, or the lower ones tri-lobed. Flowers axillary, on short, glandular pedicels. The seeds are oily and edible.

S. INDICUM, *De Candolle.*—Stem erect, pubescent; leaves ovate-oblong, or lanceolate; the lower ones trifid or tri-lobate. Capsule mucronate from the persistent style, pubescent.

De Candolle, *Pl. rar. Genev.* 18; Linn., (*var. a.*) *Sp. Pl.* 884; Sims, (*var. b.*) *Bot. Mag.* 1688; Linn., (*S. orientalis,*) *Sp. Pl.* 883.

Common Names.—Sesamum; Benne.

This plant has been known from a very early period, and is noticed by most of the ancient writers as in general use. It is a native of India, but is now cultivated in many parts of Asia and Africa, and was introduced into Carolina by the negroes, and is also extensively grown in many of the West Indian islands. Both the seeds and the leaves are officinal. The first are small, yellowish, or in some cases blackish, of a pleasant, mucilaginous taste,

and abounding in a bland, inodorous oil, closely resembling that of the olive, and used for similar purposes. The seeds are much employed in many parts of Asia and Africa, as well as by the negroes in our Southern States, and in the West Indies, as an article of food, prepared in a variety of different modes.

The oil is inodorous, of a bland, sweetish taste, and will keep a long time without becoming rancid. It is much employed in Asiatic countries as an article of food, instead of olive oil; the seeds furnish a very large quantity of it; Mr. Morel (*Trans. Phil. Soc.* 1) says that a hundred weight will produce ninety pounds of the oil, but other writers do not attribute as large a proportion to them.

The leaves abound in a gummy matter, which they give out to water, so as to form a rich, bland mucilage. One or two of the fresh leaves stirred in half a pint of water, will render it sufficiently viscid.

Medical Properties.—The oil is principally employed as an article of food, but is also used medicinally. In the East it is in much repute as a softener and beautifier of the skin, and as an application to furfuraceous eruptions. Administered internally, in somewhat large doses, it acts as a laxative; and Ainslie (*Mat. Ind.* ii. 256) says that in India it is considered as emmenagogue, and capable of causing abortion; this is also stated by Prosper Albinus (*Plant. Egypt.* 98). It has been employed, both alone and in emulsion, with some benefit, in dysentery and other bowel affections. The mucilage of the leaves is much used in the bowel complaints of children, and forms an emollient application in ophthalmia, diseases of the skin, &c., but is not at all superior to that of the Slippery-elm or of the pith of Sassafras.

Order 80.—BIGNONIACEÆ.—*R. Brown.*

Calyx 5-parted, 2-parted, or bilabiate, often spathaceous. Corolla with an expanded throat, and a more or less irregular 5-lobed or bilabiate limb. Stamens 5, of which one, and often three, are abortive; when four are fertile, they are didynamous. Ovary 2-celled, with the placentæ in the axis; the base surrounded by a fleshy ring or disk. Capsule woody or coriaceous, pod-like, 2-valved, many-seeded. Seeds winged, destitute of albumen; embryo straight, foliaceous.

The species are trees, shrubs, or rarely herbs; often twining or climbing. The leaves are opposite, seldom alternate; compound, or sometimes simple, exstipulate. The largest proportion of them are found within the tropics, but some extend much further north and south. They are principally noted for the beauty of their flowers, but some of them are possessed of medicinal powers. *Catalpa cordifolia* is said to have a vermifuge bark, and emetic wood. A decoction of the pods has been recommended in pectoral complaints; and the dried seeds, smoked like tobacco, have proved useful in asthma; the leaves are emollient and somewhat anodyne, and have proved beneficial in local pains, used as a cataplasm. Several species of *Bignonia* have been employed, some of which appear to possess active properties. *B. antisyphilitica* of Brazil is considered in that country as one of the most effectual remedies in syphilitic swellings of a malignant character (*Martius*). *B. chica* affords a red colouring matter, which dyes cotton of an orange red. The bark of *B. leucoxylon* is esteemed an antidote to the poison of the Manchineel (*Flor. Med. Antill.* iii. 244). The branches of *B. echinata* are said to be used to adulterate Sarsaparilla. *Tecoma impetiginosa* abounds in tannin, and its bark is employed in decoction as a fomentation in debility of the limbs. *T. ipe* has similar qualities, and is used in Brazil to form a gargle in aphthous affections of the mouth and fauces. The root of *T. stans* is diu-

retic; and that of *T. speciosa* is both diuretic and cathartic. The leaves of *Sparattosperma lithontriptica* are stated by Martius to be bitter, acrid, and diuretic, and to be useful in calculous affections. *Jacaranda procera* has been employed in syphilis; and the Rosewood of the cabinet-makers is stated to be the product of a species of this genus, but there is no certainty on the subject.

Order 81.—SCROPHULARIACEÆ.—*Lindley.*

Calyx of 4—5, more or less united, persistent sepals. Corolla bilabiate, personate, or more or less irregular, imbricated in æstivation. Stamens 4, and didynamous; a fifth stamen sometimes present, in the form of a sterile filament, rarely antheriferous; or sometimes only two, one pair being either wanting or reduced to sterile filaments. Ovary 2-celled, with the placentæ united in the axis. Capsule 2-valved. Seeds indefinite, albuminous.

This extensive order is most abundant in the warmer temperate or sub-tropical regions, but has representatives in all latitudes. They are generally herbaceous, but sometimes shrubby plants, with opposite, verticillate, or alternate leaves. Their properties are by no means uniform, but are usually bitterish and acrid, and often endowed with deleterious qualities.

The species of *Verbascum* are mostly narcotic; the seeds of *V. thapsus* and *nigrum* are used to poison fish, and the flowers of *V. lychnitis* will, it is said, destroy mice. The juice of the leaves of *Torenia asiatica* is used on the Malabar coast in gonorrhœa, and an infusion of *Scoparia dulcis* in South America as a febrifuge, and in hæmorrhoidal affections. The juice of *Herpestis monniera* is considered as a good embrocation, when mixed with Petroleum, in rheumatic complaints; and the leaves of *H. amara* are extremely bitter and tonic. In *Calceolaria trifida* the leaves are said to be tonic and febrifugal, and in *C. pinnata* to be purgative and emetic, whilst the roots of *C. arachnoides* are much used in Chili as a crimson dye.

Fig. 223.

V. beccabunga.

Dr. Hancock (*Trans. Med. Bot. Soc.* 1829) says that *Vandellia diffusa* is a most valuable remedy in Guiana as an emetic and febrifuge in malignant fevers and dysentery, especially where the liver is disordered. *Euphrasia officinalis* is somewhat bitter and astringent; at one time it had a great reputation in diseases of the eye, but is not now employed. Dr. Kranichfeld (*Med. Gaz.* xx. 528) says, however, that he has found it beneficial in catarrhal ophthalmia, as well as in other affections dependent on catarrh. Several species of *Veronica* have enjoyed considerable reputation as medicinal agents. *V. beccabunga* was much praised by the earlier writers as a depurative and antiscorbutic, and is still employed in Europe. *V. officinalis* also attained much celebrity in pulmonary affections, but does not appear to have any other properties than those of a mild astringent. *V. peregrina* is supposed in some parts of the United States to be very efficacious in scrofulous tumours

on the neck, hence its common name of Neck-weed; it is given internally, and used as a wash.

Scrophularia.—*Linn.*

Calyx 5-parted or 5-cleft, nearly equal. Corolla globose, with a short 5-lobed limb, the segments of which are rounded, and the uppermost united into an upper lip. Stamens didynamous, inclined, with transverse, 1-celled anthers; a fifth rudimentary stamen, with a lamelliform anther sometimes present. Stigma emarginate. Capsule roundish, often acuminate, with the valves entire, or merely bifid.

The species of this genus are principally indigenous to the south of Europe, the Levant, and Barbary, but some are found in almost every part of the world. As the name indicates, they were at one time considered as possessing a curative power in scrofula, but are now but seldom employed; though several species are officinal.

S. nodosa, *Linn.*—Leaves cordate, acute, deeply serrated, glabrous, three-ribbed at base. Stem rather obtusely 4-angled. Root tuberous.

Linn., *Sp. Pl.* 863; *English Bot.* 1544; Woodville, v. 42; Lindley, *Med. Flor.* 503.

It is perennial, and a native of several parts of Europe, flowering in July. The leaves have a rank, fetid smell, and a disagreeable, bitter taste. The root has also a nauseous odour, and a sweetish, subacrid taste. They yield their properties to water and alcohol, and have been analyzed by Grandoni (*Pereira*, ii. 306), and found to contain: a brown, bitter Resin, an Extractive having the odour of benzoic acid, Extractive, with gum, Starch, Inuline, &c.

Medical Properties.—The Figwort is considered diuretic and sedative, but is seldom employed in regular practice, though it is much used as a popular topical application to piles, ulcers, and various cutaneous eruptions. An ointment, made with the leaves, is officinal in the Dublin Pharmacopœia, and has been found useful by Drs. Stokes and Montgomery in some skin diseases. It was formerly much employed in itch, and formed an ingredient of the celebrated ointment of Tragus, so much esteemed in the cure of that complaint. It is evident that this plant is possessed of active properties, and although it is not true, as observed by Gerarde, "that if it be hanged about the neck, or else carried about by one, it keepeth a man in health," still it is worthy of further trials, in the cases in which it formerly attained so much reputation.

Almost all the species are possessed of the same sensible qualities, and those peculiar to this country, the *S. marilandica* and *S. lanceolata*, are much esteemed in some parts for their vulnerary and soothing powers, when used in fomentations or poultices to ulcers, tumours, &c.

Gratiola.—*Linn.*

Calyx 5-parted, often with two bracts at base. Corolla irregular, resupinate, 2-lipped; the upper one 2-lobed; the lower equally 3-cleft. Stigma 2-lobed. Capsule 2-celled, 2-valved.

A genus of about thirty species, a large proportion of which are East Indian and American, principally in the warmer portions. The name is a diminutive of *gratia*, and the epithet *gratia Dei*, by which the officinal species was formerly distinguished, is an evidence of the high estimation in which it was held.

G. OFFICINALIS, *Linn.*—Leaves ovate-lanceolate, serrate, 5-ribbed, smooth. Flowers solitary.

Linn., *Sp. Pl.* 24; Woodville, ii. 360; Lindley, *Flor. Med.* 507; Stephenson and Churchill, i. 33.

It is a native of the south of Europe, growing in meadows and moist places, and flowering in June and July. In some spots, according to Haller, it occurs in such abundance as to render the meadows useless as pasture grounds, from the injury it does cattle. The whole plant is officinal; it is inodorous, but has a bitter, nauseous taste. It gives out its properties to water and alcohol. From an analysis by Vauquelin (*Ann. de Chim.* lxxii. 191), it appears to contain, a brown, gummy Extractive, a very bitter, Resinous matter, some salts, &c. This resinous substance is the active portion, and has been called *Gratiolin* by Alibert. Since this examination of it, Dr. Whiting has announced the existence of *Veratria* in it, which accounts for its active properties.

Medical Properties.—The Hedge hyssop is an energetic drastic cathartic and emetic, and also often proves diuretic. Although seldom used in England, and almost unknown in this country, it is much prescribed on the Continent of Europe as a hydragogue purgative in many complaints, especially those of a dropsical character, and it is spoken of in high terms by some of the best authorities. Dr. Kastizewski (*Diss. de Gratiola*) states that he has obtained great success with it in syphilis, especially in the secondary forms, and it has also been employed beneficially in several cutaneous affections. Hufland also speaks highly of it as a remedy against ascarides. Its principal reputation, however, is founded on its forming the active ingredient in the celebrated gout medicine, the *Eau medicinale*, which is a strong vinous tincture of it, and the presence of Veratria explains why the tinctures of Colchicum and Veratrum are possessed of the same properties.

When given in over-doses the Hedge hyssop causes violent vomiting and purging, with much pain in the bowels; and M. Bouvier mentions (*Jour. Gen. de Med.* liv. 259) four cases of severe nymphomania, caused by injections of a strong infusion into the rectum.

The dose of the powder is from fifteen to thirty grains; of the infusion, made with half an ounce of the dried plant to a pint of boiling water, half an ounce to an ounce; of the vinous tincture, about forty to fifty drops.

Several of the other species of Gratiola have the same properties, among which the *G. aurea*, a native of this country, is fully as powerful, and might be advantageously used as a substitute for the *G. officinalis*.

CHELONE.—*Linn.*

Calyx 5-parted, with 3 bracts. Corolla ringent, ventricose. Sterile filament shorter than the others; anthers woolly. Capsule 2-celled, 2-valved. Seeds many, with a membranaceous border.

A North American genus of a few species, all herbaceous plants, with opposite leaves, and sub-imbricately spiked, terminal flowers, having the lower lip of the corolla bearded internally.

C. GLABRA, *Linn.*—Smooth, leaves lanceolate, oblong, acuminate, serrate; flowers in dense spikes.

Linn., *Sp. Pl.* 748; Torrey, *Comp. Flor.* 243; Rafinesque, *Med. Fl.* ii. 117.

Common Names.—Snakehead; Shell flower, &c.

Description.—Root perennial. Stem erect, from two to four feet high, somewhat quad-

rangular. Leaves subsessile or petiolate, lanceolate, acuminate, more or less serrated. Flowers terminal in a dense short spike, each flower sessile and furnished with three bracts, which are ovate, acute and entire. Calyx with five unequal imbricated segments, oblong and obtuse. Corolla ringent, ventricose, convex above, five-lobed, two-lipped, the lower lip bearded within. Stamens didynamous, with woolly anthers; and a short sterile filament. Ovary ovate, with a slender style. Capsule oval, two-celled and two-valved, with many small seeds having a membranaceous margin.

Fig. 224.

C. glabra.

There are numerous varieties of this plant, differing in the form and insertion of the leaves and in the colour of the flowers, which vary from pure white to purplish. These flowers are large and ornamental but inodorous, and resemble in form the head of a snake or turtle. It is found in most parts of the United States in wet situations, and blossoms from July until late in the autumn. The part used is the leaves; these are inodorous but excessively bitter. No analysis has been made of them, but they appear to contain Gallic acid, and a Bitter extractive, &c.; they communicate their properties to both water and alcohol.

Medical Properties.—These are said to be tonic, cathartic and hepatic, but no certain information has been afforded on the subject, the only writer that mentions the plant being Rafinesque, who derived his knowledge of it from the Shakers. He states that in small doses it is laxative, but in full ones it purges actively, acting powerfully on the liver, and also that it is held in much esteem by the Indians in a variety of complaints. The dose is a drachm of the powder. It has been noticed here to draw attention to it, for should it possess the powers attributed to it, it will prove a valuable addition to the Materia Medica.

Digitalis.—*Linn.*

Calyx five-parted, unequal. Corolla campanulate, limb obliquely four-lobed, lobes unequal. Stamens four, didynamous, no vestige of a fifth. Stigma simple or bi-lamellate. Capsule ovate acuminate.

Most of the species of this genus are natives of warm climates, and many of them appear to be merely varieties or hybrids of the *D. purpurea* and *lutea*. They all are endowed with active qualities, though only one is officinal. The name is derived from the resemblance of the flower to a finger-stall or thimble, *digitalis*, and was bestowed upon it by Fuchsius in 1542. Pereira states that in a Saxon manuscript in the Cottonian library, older than the Norman conquest of England, it is noticed under the name of Folksglove, which appears to be the earliest record of it, as none of the descriptions of the earlier writers apply to it.

D. PURPUREA, *Linn.*—Segments of the calyx ovate, acute; corolla obtuse, upper lip scarcely divided; leaves ovate, lanceolate, crenate, downy.

Linn., *Sp. Pl.* 868; Woodville, t. 24; *Flor. Med.* iii. 151; Stephenson and Churchill, i. 18; Lindley, *Flor. Med.* 502.

Common Names.—Fox-glove; Finger flower.

Foreign Names.—Digitale pourpre, *Fr.;* Guantelli, *It.;* Der gemeine finger hut, *Ger.*

Description.—Root biennial, whitish. Stem round, erect, downy, about three or four feet in height. The lower leaves are large, ovate, acuminate, on short, winged petioles, and spreading on the ground; the cauline ones are alternate, elliptical-oblong, somewhat decurrent, and both are tomentose, wrinkled, crenated, and of a dull-green colour above, paler beneath. The flowers are numerous, on short peduncles, drooping, of a reddish or purple colour, and are arranged in a long terminal spike. The calyx is divided into five acute segments, of which the uppermost is the narrowest. The corolla is bell-shaped, hairy, spotted within, inflated on the lower side, and narrowed at base, the upper lip somewhat cleft, emarginate, and smaller than the lower. The stamens are subulate, inserted in the base of the corolla, declined, and support large, oval, deeply-cleft anthers. The ovary is pointed, ovate, having a simple style, with a bifid stigma. The capsule is ovate, acuminate, two-celled and two-valved, containing numerous small, oblong, brownish seeds.

Fig. 225.

D. purpurea.

The Fox-glove is a native of Europe, and is cultivated in this country; it flowers in June and July. There are several varieties of it, one of which, with white flowers, is often met with in gardens. As before mentioned, notwithstanding the striking appearance of this plant, it does not appear to have been noticed by the ancients. It is supposed by Mr. Rootsey to be the plant alluded to by Shakespear under the name of *Long purples* (*Hamlet*, iv. 7), though other writers consider that the poet referred to some species of Orchis. It appears to have early attracted the attention of physicians, and Gerarde says of it, "boiled in water or wine and drunken, it doth cut and consume the thicke toughness of gross and slimie flegme, and naughtie humours. The same, or boiled with honied water and sugar, doth scour and cleanse the breste, ripeneth and bringeth forth tough clammie flegme."

It was first recognised as officinal in the London Pharmacopœia of 1721, but omitted in that of 1746, though afterwards restored, and this same course was pursued by the Edinburgh College. Its powers, however, were not understood until about 1775, when it was noticed by Withering as a powerful diuretic in dropsy, since which it has maintained a high rank among the heroic remedies. As an instance how little was known respecting it anterior to this time, Lemery, in his great work says of it, "elle est detersive, un

peu laxative," and James (*Pharm. Universalis*, 1747) states that it "is emetic and vulnerary, and agrees in its virtues with the pilewort." Even Vogel (*Hist. Mat. Med.* 1760) merely observes that "acris est, intus assumta vomitum movet et purgat; extus contusa ad strumas, podagram et rachitidem ab Anglis prædicatur. De utroque vero dubitat."

The parts employed are the leaves and seeds, the latter, however, but seldom. The leaves should be collected about the time of the inflorescence; those from plants of the first year are very inferior. They should be dried in the dark, and always kept protected from the light. Much of the digitalis in our shops is derived from plants cultivated in this country, and although in some cases of good appearance, is far from being as efficient as the foreign article obtained from the wild plants. In general, however, it is almost worthless, being mouldy and changed in colour, which is always an indication of deterioration. When good, the leaves should have a dull-green colour, a feeble but somewhat narcotic odour, and a bitter, unpleasant taste. The seeds, which are not employed in this country, but are recognised by the Dublin College, are small, roundish, and of a grayish-brown colour.

Numerous analyses have been made of the leaves, one of the latest of which is that of Radig (*Pereira*, ii. 297); he found in it Picrin, Digitalin, Scaptin, Acetic Acid, &c. The substance he calls picrin is the digitalin of Le Royer (*Bib. Univer. des Sci.*), and appears to be one of the active principles, though not the principal, which is the digitalin; this is a white, somewhat crystalline substance, of an intensely bitter taste, soluble in alcohol, but scarcely so in water, not soluble in the acids, and possessing all the properties of the leaves in a very concentrated degree. Scaptin is a brown extractive, which leaves an acrid sensation in the mouth. The fullest account of digitalin is that by M. Homolle (*Am. Jour. Pharm.* xi. 97).

Medical Properties.—Digitalis acts in a different manner on the system according to the dose and mode of administration, but is exceedingly variable in its effects in whatever way it is given. In small quantities often repeated, it usually affects the organic functions, either singly or collectively, the most obvious and frequent results being an increased flow of urine, and a reduction of the frequency and force of the pulse, but both these are very inconstant; in some cases the diuretic effect of the medicine cannot be produced, whilst in others it readily occurs, even from very small quantities; but its influence over the circulation is still more capricious, for though its more general result is to decrease the activity of the pulse, in some instances it operates in a diametrically opposite manner, or it may cause an irregularity of it, whilst on some individuals the medicine appears to exercise no power over the circulation, even in large doses.

This article is said to be one of those, which given in frequently repeated doses, have a *cumulative effect*, or in other words, do not display their powers for a certain time, and then produce effects equivalent to the whole amount administered; that this has happened there can be no doubt, but the experience of most practitioners shows that it is much less frequent than has been supposed, though it should always be borne in mind that such an event is possible, and is to be guarded against by suspending the use of the medicine from time to time, and closely watching its effects.

Where it is given in too large doses, or its employment too long continued, it operates like the acro-narcotics, especially tobacco and lobelia, causing a disordered condition of the digestive organs, the circulation and the cerebro-spinal system. In still more increased quantities it induces vomiting, purging, stupor, or delirium; slow, feeble and irregular pulse, cold sweats, great prostration of strength, disordered vision, followed, if the person be not relieved,

by insensibility and convulsions. Where these symptoms occur, the stomach should be promptly evacuated if it is supposed that any of the poison remains in it, and the condition of the system combated by the administration of the diffusible stimuli, as brandy and volatile alkali.

Digitalis is employed to fulfil several indications: to produce diuresis, to promote absorption, to reduce the activity of the pulse, and sometimes though more rarely as a cerebro-spinant. For the former of these purposes it is often administered in dropsy, and has attained much celebrity for its powers, though it frequently fails in producing any good effect, and it requires some judgment in the selection of cases in which it may be beneficially employed. Withering has justly stated that it seldom does any good where the pulse is vigorous and the strength unimpaired, whilst in an opposite state of things it constantly succeeds; nor does it display equal effects in all forms of dropsical disease, those of a general character being more benefited by its use than those of a confined nature, as hydrocephalus or ovarian dropsy. Notwithstanding its value in these complaints, it is of much more marked benefit in those cases where it is of importance to restrain the activity of the circulation, as in diseases of the heart and great vessels, and in some forms of hemorrhage; in these cases its beneficial effects have been unequivocal, especially when aided by repeated abstraction of blood and low diet.

As regards its efficacy in the cure of Phthisis, notwithstanding the eulogies of Beddoes, Ferriar, Fowler and others, it has been shown by more accurate observation that it possesses no curative powers, and only acts as a palliative by diminishing the rapidity of the circulation, but does not in any degree retard the progress of the tubercular disease. It has also been given in pertussis, asthma, chronic bronchitis and the mental affections, and has occasionally been efficacious, from its double power of repressing vascular excitement, and of acting on the brain and nervous system.

Formerly it was much used in fomentations and ointments, and so highly was it esteemed by the Italians, that they have an adage "aralda tutte le piaghe salda," foxglove cures all wounds. It is now seldom employed externally, though Murray (*Apparat. Med.* i. 491), speaks highly of it, and an endermic use of it might be advantageous, where it could not be given internally.

Digitalis is prescribed in powder, in doses of about a grain, two or three times a day, gradually increasing the dose, until its peculiar effects manifest themselves, when it is to be reduced or wholly omitted. It should be noticed that this remedy is very permanent in its operation, as when it once affects the system, its action continues for some time, without an additional quantity being administered. It is also frequently given in infusion and tincture, both of which are officinal. The dose of the first is from half an ounce to an ounce, to be repeated as with the powder; of the tincture ten drops, in the same manner. An extract has also been recommended, but without great care in its preparation, all the properties of the medicine are destroyed, nor is such an article needed, as the original substance is sufficiently energetic. The decoction is the worst form in which it can be administered, as the powers of the medicine are much impaired or even destroyed by heat.

Several other species or varieties of Digitalis are used, as the *D. tomentosa*, *ambigua*, *epiglottis*, *ferruginea*, &c., which are said to be identical in their effects with the *purpurea*. The *D. lutea* is stated by Careno to possess much greater diuretic powers, though in other respects to be analogous to the common species; this, however, is denied by Vitet (*Mat. Med.*), Trousset, and others.

Group XXXIII.—Cortusales.

Order 82.—PLUMBAGINACEÆ.—*Lindley.*

Calyx tubular, 5-toothed, plaited, persistent. Corolla hypocrateriform, limb 5-parted, (sometimes with 5 almost distinct petals). Stamens 5. Styles 5, either partially united or distinct. Ovary superior, 1-celled, 1-seeded; ovule pendulous, attached to the apex of a filiform podosperm which rises from the bottom of the cell. Pericarp a capsule covered by the calyx, sometimes indehiscent, or opening by 5 valves.

This order is composed of herbaceous or suffruticose plants with entire, alternate or clustered leaves, usually crowded at base, and often sheathing or clasping, without stipules, but sometimes marked with pellucid dots. Most of the species are sea-side plants and natives of the temperate regions. Some are tropical, more especially those belonging to *Plumbago*. The properties of the order are very various, as some of the species are tonic and astringent, and others are extremely acrid and even caustic; these latter characters are powerfully developed in *Plumbago*, almost all of which are so active as to operate as vesicatories when applied to the skin. The bark of the root of *P. zeylanica*, bruised into a paste, is used by the native practitioners in India as an application to incipient buboes. (Ainslie, *Mat. Ind.* ii. 77.) The contused root of *P. rosea*, is employed in many parts of the East Indies as a vesicant; it excites more inflammation than cantharides, but much less serous discharge. It is also prescribed internally, in small doses, in rheumatic and paralytic affections. (*Ibid.* 379.) The *P. scandens*, a native of South America and the West Indies, is extremely active, and is known in the French islands under the name "Herbe du diable." Pison speaks of it (*Bras.* 105), as a good emetic in cases of the ingestion of poisons; but, according to Descourtilz (*Flor. Med. Antill.* iii. 94), it is too energetic to be given with impunity; Brown, (*Hort. Jam.* ii. 235,) also speaks of it as extremely corrosive. The European species, *P. europæa*, has long been employed as a medicinal agent, and appears to be the *tripolion* of Dioscorides. Bauhin speaks of it as a valuable odontalgic, when used as a masticatory, and other writers notice it as a good application to old and malignant ulcers and even cancers. It has also been found useful in itch, and was at one time much employed in the South of Europe in the treatment of that disease. Taken internally it causes nausea and vomiting, with much irritation of the stomach and bowels. According to Dulong d'Astafort, the root contains a peculiar principle, which he calls *Plumbagin* (*Journ. Pharm.* xiv. 441).

The other species of the order are principally tonic and astringent; these properties are remarkably developed in *Statice*. *Armeria vulgaris* is regarded in Germany as a powerful diuretic. The flowers are given in decoction, which is aromatised with cinnamon or anise; when freely taken, this is said to excite a copious excretion of urine. (*Med. Gaz.* xx. 144.)

Statice.—*Linn.*

Calyx tubular, scarious, plaited. Corolla with limb of 5 almost distinct petals. Stamens 5. Styles 5, germen superior. Seed one, invested by the calyx.

A numerous genus, principally native in the southern part of Europe, though some of the species are found in most parts of the world. The roots of many of them are very astringent, but only one is officinal in our Pharmacopœia.

S. CAROLINIANA, *Walter*.—Radical leaves obovate lanceolate, acutely mucronate, entire, smooth; scape alternately branched, flowers geminate, in unilateral spikes.

Walter, *Fl. Car.; Nuttall. Gen.* i. 206; Rafinesque, *Med. Fl.* ii. 93; Bigelow, *Am. Med. Bot.* ii. 51.

Common Names.—Marsh Rosemary; Ink root, &c.

Description.—Root perennial, fusiform, obtuse, fleshy, of a brownish-red colour. Radical leaves petiolate, erect, cuneiform, smooth, mucronate, entire. Scapes round, smooth, from a foot to eighteen inches high; paniculate above, divisions alternate, bearing unilateral spikes of small, somewhat sessile flowers, each with two scaly mucronate bracts. Calyx funnel-shaped, five-toothed, five-angled, the angles ciliate. Corolla blue, deeply five-cleft, divisions spatulate, obtuse. Stamens five, inserted on claws of corolla. Ovary superior, small, and obovate, supporting five styles, shorter than the stamens. Seed oblong.

Fig. 223.

S. caroliniana.

This species approaches so closely to the foreign *S. limonium* and *S. gmelini*, that many botanists consider it as a mere variety; but these have oblong, undulated leaves, whilst in the American plant, they are perfectly flat and cuneiform; the flowers also of the *limonium* are much larger. It is found along the seacoast in marshy situations from Maine to Florida, flowering during the latter part of the summer. There are several varieties, differing in the colour of the flowers, the length of the leaves, &c.

The officinal part is the root, which is fusiform or branched, heavy, fleshy, and of a reddish or purplish-brown colour. The taste of it is very bitter and astringent, but neither the root nor any part of the plant has any odour. It imparts its virtues to water or alcohol, but more readily to the former by the aid of heat. According to an analysis, by Mr. E. Parrish, (*Am. Jour. Pharm.* xiv. 111,) it contains about 12 per cent. of Tannin, some Gum, Extractive matter, &c., but no Gallic acid, as indicated by Dr. Bigelow, who, it should be noticed, is of opinion that this root is equal in astringency to galls, and that the best mode of exhibition is the cold infusion, a statement at variance with the experiments of Mr. Parrish.

Medical Uses.—It is a powerful astringent, and is much employed in some parts of the country in diseases of the bowels, and in decoction, as a gargle in aphthous and ulcerated sore mouth, or in affections of the throat and fauces, and has been found useful in some forms of cynanche, when other astringents have failed in making any impression. As a remedy in diarrhœa it enjoys much popular reputation; but is only suitable to the latter stages, where a tonic and astringent action is required. It is applicable to

the same character of cases as the other powerful astringents, and its use is to be regulated in the same manner. It is given in infusion or decoction, which are rendered more palatable by the addition of some of the aromatics. The tincture may be employed as a good substitute for that of Kino. It may be stated that Dr. Zollickoffer speaks of this root as endowed with some emetic and sudorific properties. Dr. Coxe, (*Amer. Dispen.* 605,) says that Dr. Hews, of Providence, esteemed this plant very highly in ulcerated sore throat and scarlatina anginosa, and also in those cases of aphthous fever attendant on dysentery, as it could be administered where bark was inadmissible. Dr. Baylies, of Dighton, also notices it favourably in ulcerated sore throat; he says that in large doses it acts as an emetic, and in a smaller as a powerful expectorant, and also possesses considerable antiseptic powers. Dr. Mott, of New York, also speaks highly of its powers in a variety of cases where astringents are required. (*Experim. Inquir. on Statice, &c.*)

The *S. limonium* of Europe is possessed of the same powers, but in a less degree, and was very early employed as an astringent, being noticed by Dioscorides, Pliny, and others, and at one time enjoyed much reputation, but has been gradually supplanted by other articles, which, in many cases, owe their favour rather to caprice and higher price than to any superiority of remedial power. Other species have also been used; thus, the *S. speciosa* is employed in Russia in prolapsus uteri, and the *S. tatarica*, closely allied to the *limonium*, is esteemed in Siberia as a powerful astringent, where it is also used for the purpose of tanning leather.

Sub-Class III.—Apetalous Exogenous Plants.

Group XXXIV.—Asarales.

Order 83.—ARISTOLOCHIACEÆ.—*Lindley.*

Calyx tubular, adherent, with the segments valvate or induplicate in æstivation, regular or irregular. Corolla wanting. Stamens 6—12, epigynous, distinct or adhering to the style and stigmas. Ovary inferior, 6-celled, rarely 3—4-celled. Ovules indefinite, anatropal, attached horizontally to the axis. Style simple. Stigmas radiating; as numerous as the cells of the ovary. Fruit dry or succulent, 3—4—6-celled; many-seeded. Seeds thin, angular or round, with a very minute embryo placed at the base of a fleshy albumen.

An interesting order, with numerous species of herbs or shrubs, the latter often climbing. The wood has no concentric zones, or inseparable wedges. The leaves are alternate, simple, petiolated, often with an opposite stipule, or with none. The flowers are hermaphrodite. They approach the Endogenous plants very closely in their structure, and are therefore usually classed at the confines of this class, and of the Exogens.

They are principally natives of the tropical parts of South America, but are found sparingly in North America, Siberia, and Europe; in the latter usually in those regions bordering on the Mediterranean; a few also occur in India.

These plants are in general possessed of tonic and stimulating properties,

and have been considered as eminently emmenagogue. Many of them are held in high estimation also as alexipharmics.

Asarum.—*Linn.*

Calyx campanulate, 3—4-cleft. Corolla wanting. Stamens 12, inserted on the ovary. Anthers adnate to the middle of the filaments. Style short. Stigma stellate, 6-lobed. Capsule inferior, six-celled, crowned by the persistent calyx.

A small genus of low herbaceous plants with creeping rhizomes, having short bifoliate stems, and a single dichotomal flower. The roots in all of them are aromatic, and pungent. Two species are officinal, one in Europe and one in the United States.

1. A. europæa.—Leaves reniform, obtuse, binate.

Linn., *Sp. Pl.* 633; Woodville, i. t. 66; *Engl. Bot.*, t. 1083; Stephenson and Churchill, i. 23; *Flor. Med.*, i. t. 43.

Common Names.—Asarabacca; Hazelwort; Wild Nard.

It is a native of many parts of Europe, growing in moist shady situations, and flowers in April and May. It was known to the ancients under the name of Asarum, but it appears from Pliny that it was confounded with the *Baccharis*, and it has been supposed that its common name of Asarabacca was a compound of both these appellations. The leaves and roots, which are the parts used, have a pepper-like odour, and an acrid, bitter, somewhat aromatic taste; the odour of the leaves is very slight. According to Gräger, they contain a liquid Volatile Oil, a Neutral principle, which he calls *asarite*, and a Bitter substance, which he denominates *asarin*, some Camphor, Citric acid, &c.

Medical Uses.—The roots and leaves have emetic, cathartic, and diuretic properties. At one time they were very much employed to excite vomiting, but since the introduction of ipecacuanha are seldom used for this purpose. In large doses they operate on the bowels with griping pains. Dr. Cullen has given them among his list of diuretics, but is doubtful if they have any specific power in exciting the action of the kidneys. According to Richter, however, this plant is capable of exercising a stimulant influence on the whole of the nervous and vascular system. It has also been recommended in fevers, obstructions, dropsies, &c., and is used by farriers as a vermifuge in horses.

It is now mainly employed as a sternutatory. The powder in doses of one or two grains snuffed up the nostrils creates much irritation, accompanied by violent sneezing, and a copious flow of mucus. This discharge sometimes continues for several days, and hence its administration in this way has proved useful in some affections of the head, eyes, and teeth. The so-called Cephalic snuffs usually owe their errhine properties to this plant. The dose of the powder as an emetic is from thirty grains to a drachm. The leaves being milder than the root must be given in larger doses.

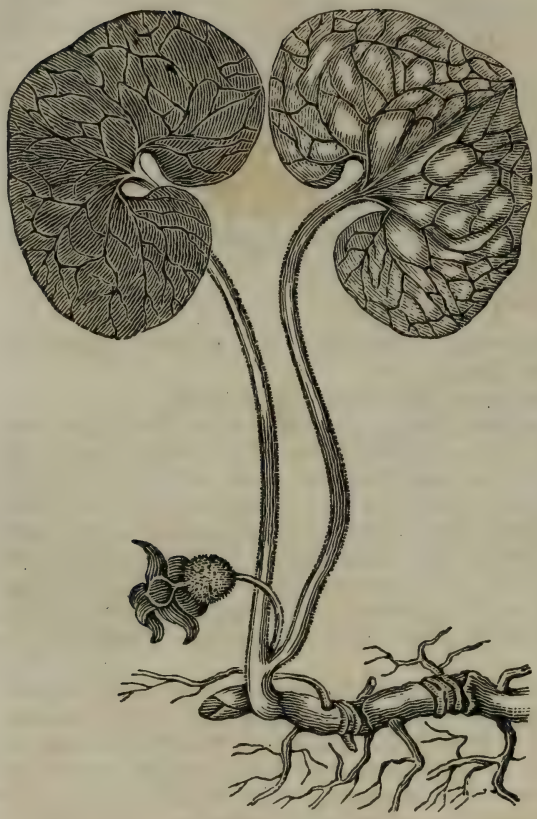
2. A. canadense, *Linn.*—Leaves broad, reniform, entire, puberulent. Flowers tomentose, three-parted.

Linn., *Sp. Pl.* 633; Bigelow, *Med. Bot.* i. 150, t. 15; Barton, *Veg. Mat. Med.* ii. 85, t. 32; Rafinesque, *Med. Flor.* i. 70.

Common Names.—Wild Ginger; Colt's-foot; Indian Ginger, &c.

It is found in most parts of the United States in shady woods, especially

Fig. 227.



A. canadense.

in hilly situations, but always in rich soil. It flowers from the last of April to the beginning of June.

The root, which is the part employed, as found in the shops is in long, somewhat twisted, or contorted pieces, about as thick as a small quill, wrinkled and brownish externally, and whitish or yellowish within. The taste is aromatic and bitterish, and is thought to be intermediate between that of ginger and serpentaria, but by some persons considered to be more analogous to that of cardamoms. The taste of the petioles is less aromatic but of a more decided bitter. The smell, especially of the fresh root, is aromatic and grateful. An imperfect analysis of the root was made by Dr. Bigelow, showing the presence of an Essential oil, a red, bitter, Resinous matter, &c. It was afterwards examined by Mr. Rushton, (*Am. Jour. Pharm.* x. 181), and more recently by Mr. Wm. Procter (*Ibid.* xiii. 177). All these analyses prove that the active principle is an aromatic essential oil, and that the *A. canadense* does not contain either asarin, camphor, or asarite.

Medical Uses.—The root is an aromatic stimulant, and in a warm decoction is possessed of no inconsiderable diaphoretic properties, resembling the Serpentaria in its action on the system, and may be advantageously used as a substitute for it, but is rather more stimulating. It has also been administered with some success in colic and other painful affections of the stomach and bowels, where no inflammation exists. Dr. Firth gave it with benefit in the tetanus of children arising from cold. The leaves were supposed to possess the emetic properties of the European plant, but the observations of Drs. Bigelow and Barton, prove that such is not the case, and that where vomiting has been caused by them, it is more attributable to the quantity taken, than to any inherent emetic qualities of the leaves themselves. When dried and powdered they have powerful errhine properties. The root may be given in powder, tincture, or infusion; the dose of the powder is about half a drachm.

This root is used in some parts of the country as a substitute for ginger, and for many purposes is fully equal to it. It also forms the basis of a spirituous drink. It deserves more attention than it has received, as it may be employed as a substitute for Serpentaria in almost all cases to which that useful root is applicable.

The roots of the other American species, the *A. virginicum* and *A. arifolium*, are similar in their properties, but do not appear to be quite as aromatic or powerful, though Rafinesque is of opinion that the former is more grateful in its odour and taste than the *Canadense*. They are natives of the Southern and Southwestern States.

ARISTOLOCHIA.—*Tournefort.*

Calyx monosepalous, tubular, ventricose at base, dilated at the apex, forming a ligula. Anthers six, subsessile, inserted on the style. Stigma 6-lobed. Capsule 6-angled, 6-celled, many-seeded.

This genus is composed of herbaceous or shrubby species, with erect or twining stems, and usually cordate or entire leaves; sometimes, but rarely, 3-lobed. The flowers are axillary or radical, with an oftentimes recurved tube. The species are numerous, and are principally natives of the warmer regions of South America; these are principally shrubby. Some are found in North America, in the countries bordering on the Mediterranean, and in India. They are almost invariably tonic and stimulating, and a great number have been employed for medical purposes, though only one is officinal.

It is remarkable that a firm belief in the efficacy of these plants as antidotes in cases of the bites of poisonous snakes should exist in all parts of the world, and among nations who could have had no communication with each other, though it does not appear that they possess any alexipharmic properties beyond those dependent on their stimulating powers. The active portion in them all is the root, which, in some species, besides a stimulating quality, is extremely acrid, especially in a fresh state, and requires much caution in its administration.

The genus has been much divided of late years, and several genera and sub-genera proposed; some of these are founded on just distinctions, whilst others rest on insufficient characters. As, however, the medical characters of all of them agree, for the most part, it has been thought preferable to consider them under one head.

1. A. SERPENTARIA, *Linn.*—Stem slender, flexuous, erect. Leaves cordate, acuminate, pubescent. Peduncles almost radical, 1-flowered. Lip of the calyx lanceolate.

Linn., *Sp. Pl.* 1363; Woodville, i. 153, t. 59; *Flor. Med.* vi. t. 325; Barton, *Veg. Mat. Med.* ii. 41, t. 28; Bigelow, *Med. Bot.* 482, t. 49; Rafinesque, *Med. Fl.* i. 61.

Common Names.—Snakeroot; Virginia Snakeroot; Snakeweed.

Foreign Names.—Serpentaire de Virginie, *Fr.;* Schlangen osterluzey, *Ger.;* Serpentaria, *It.*

Description.—Root perennial, composed of numerous slender fibres, arising from a knotty, brown head. Stems one or several, round, slender, flexuous, jointed, about eight or ten inches in height, usually of a reddish colour near the base. Leaves alternate, petiolate, oblong or lanceolate, entire, acuminate at apex and cordate at base, surface more or less pubescent, of a pale-green colour. The flowers are nearly radical, on 1-flowered, curved, somewhat scaly peduncles. The calyx is of a purplish or reddish colour, with a curved tube and a bilabiate limb, the upper segment being notched and the lower entire. There is no corolla. The anthers are six, and sessile, oblong, obtuse,

Fig. 228.

A. serpentaria.

and attached to the sides of a large, round, sessile stigma. The capsule is obovate, with six angles, six cells, and containing numerous seeds.

There are numerous varieties of this plant, some of which may be found to be entitled to the rank of species. The leaves in some, are narrow and almost hastate, whilst in others they are broad. The specimens figured in the respective works of Bigelow, Barton, and Rafinesque differ much. Thus that of the first has tri-nervate, undulated leaves, with large, bilabiate, red flowers, the peduncles with large and broad scales, and the stamens amounting to twelve. That represented by Barton has long and slender peduncles, almost destitute of scales, and the flowers small, purple, and scarcely bilabiate; that of Rafinesque, which is drawn from a western specimen, represents the variety most commonly found in this vicinity, though that of Barton is not unfrequently met with.

Under the name of Virginia Snakeroot, several species are confounded in the drug market,—namely, those of the *A. serpentaria* and its varieties; of the *A. tomentosa*, *A. hastata*, *A. hirsuta*, and *A. reticulata;* the latter of which, of recent introduction, is now much used. This is of no consequence in a remedial point of view, as they are identical, or nearly so, in their properties, but is of interest to the medical botanist, and they will therefore be noticed before entering upon the properties and uses of Snakeroot. In these observations much assistance has been derived from an essay on the subject by Dr. Bridges (*Am. Jour. Pharm.* xiv. 118).

2. A. HIRSUTA, *Muhlenberg.*—Stem flexuous, jointed, erect, pubescent. Leaves alternate, large, cordate, rounded, obtuse; upper ones abruptly acuminate, very pubescent, with prominent veins. Peduncles sub-radical, scaly, 1-flowered, hirsute. Calyx also pubescent.

This species is a native of the Southern States, and is seldom or never brought to this market, but is employed at the South. The root consists of numerous slender, simple fibres, arising from a knotty caudex; they are of a yellowish colour, aromatic odour, and aromatic, bitter taste.

3. A. HASTATA, *Nuttall.*—Stem flexuous, simple, erect. Leaves mostly sub-cordate, hastate, acute, or attenuated, sub-lanceolate, auriculate. Peduncles nearly all radical. Lip of the corolla ovate.

This is the *A. sagittata*, Muhlenberg, (*Cat.* p. 81, No. 611–4,) and also

of his Herbarium; and, although admitted as a species by most botanists, does not appear to be sufficiently distinct from one of the varieties of *A. serpentaria*. At least specimens answering in all respects to it have been found in the vicinity of Philadelphia. Both Muhlenberg and Nuttall state that it is a native of the Southern States.

4. A. RETICULATA, *Nuttall.*—Stems short, sometimes branched near the roots, slender, flexuous, jointed; very pubescent when young, slightly villous when old. Leaves on short petioles, oblong, cordate, large, obtuse, reticulated with very prominent veins, villous on both sides. Peduncles sub-radical, hairy, scaly, several-flowered. Flowers on short pedicels, small, purplish, very pubescent. Capsule hexagonal, deeply sulcate, somewhat hirsute.

The root is composed of a knotty caudex, from which arise numerous long fibres, larger than those of the *A. serpentaria*, of a yellowish colour, aromatic odour, and warm, aromatic, bitter taste. It is now not unfrequent in the drug market, and is derived from the States west of the Mississippi. It is fully equal to the officinal species, and even, according to the experiments of Mr. Wiegand (*Am. Jour. Pharm.* xvi. 10), is superior to it.

5. A. TOMENTOSA, *Sims.*—Stem twining, ascending to the tops of the tallest trees. Leaves roundish, cordate, villous beneath. Peduncles solitary, axillary, ebracteate. Calyx densely villous; limb trifid, greenish-yellow, orifice oblique and gaping; margin elevated, dark-purple, rugose; inner part of tube white, with purple spots. Stigmas 3.

This species, which is found in Carolina and the States west of the Mississippi, was confounded by Nuttall with the *A. hirsuta*, but differs from it in several important particulars,—in the axillary and not sub-radical flowers, in having three stigmas, and a trifid and not a bilabiate calyx. It is more closely allied to *A. sipho*, and is included by Rafinesque with that plant in his sub-genus *Siphisia* (*Med. Flor.* i. 62). The root has not been described, but probably resembles that of *A. sipho*, in being coarser and less aromatic than those of the other species above-mentioned.

The *A. serpentaria* is found in many parts of the United States, growing in shady woods, especially on hill-sides. It is less common in alluvial and calcareous soils. It flowers in May and June; Rafinesque states but once or seldom; but in this he is in error, as, from actual observation, I am satisfied that it flowers regularly each year, after it has attained a certain age, and, as far as it has been ascertained, in its third year. In some seasons it flowers more plentifully and freely than in others, but never fails each successive year to develope its inflorescence. In consequence of the demand for the roots, it has become scarce in all the Atlantic States, or at least in their more eastern parts, but may still be found in some abundance in certain situations.

The root, as found in the shops, is in tufts of slender, long, matted fibres, attached to a knotty, rugged head. They are brittle, and of a yellowish or brownish colour. The odour is aromatic and agreeable; the taste is somewhat pungent, bitter, and aromatic. The powder is grayish. It imparts its properties to alcohol and water, affording a greenish tincture with the former, and a yellowish-brown infusion with the latter. The roots of the *A. reticulata*, as before mentioned, are very analogous, the main difference being the larger size of the fibres. Snakeroot usually comes to market in bales of about a hundred pounds, sometimes composed of the roots alone, and at others with the stems and leaves, for the most part free from foreign substances, but sometimes with an admixture of Spigelia (Smith, *Jour. Phil. Coll. Pharm.* i. 265). The foreign writers state that it is sometimes adulterated with the

roots of *Panax quinquefolium*, *Collinsonia præcox*, and *Asarum virginicum;* but these admixtures are not found in the article sold here.

Several analyses have been made of this root; by Bucholz in 1807, Chevallier in 1820, and Peschier in 1823. These show that the activity of it depends on a volatile oil, which Grassman compares in odour and taste to that of Valerian and Camphor combined; it exists in small quantity, as the same writer states that he obtained but half an ounce from 100 lbs. of the root; a bitter principle also exists, to which the tonic properties are probably owing. According to Mr. Wiegand (*Am. Jour. Pharm.* xvi. 16), the *A. reticulata* contains a larger proportion of the volatile oil, and hence is more powerful and active.

Medical Uses, &c.—It was in common use among the Indians at the time of the arrival of the first settlers, and was much esteemed by them as a remedy in snake-bites, and was soon adopted by the early colonists as an excellent tonic and stimulant. The first writer that notices it is Johnson, in an edition of Gerarde's Herbal, in 1633, since which time it has been in general use. In small doses, it acts as a stimulant to the digestive organs, and, according to Jörg, when given in large quantities, causes nausea, flatulence, an uneasy sensation in the stomach, and an increased peristaltic action of the bowels, succeeded by an increase of the fulness and frequency of the pulse, and of the heat of the skin, as well as augmentation of secretion and exhalation; in some cases, there is also some disturbance of the cerebral functions.

It is employed as a stimulant and tonic, and also acts as a diuretic or diaphoretic, according to the mode of its administration. No remedy is more popular as a tonic in febrile affections, and as a diaphoretic in a variety of complaints. In regular practice, although not as much employed as formerly, as the main agent in the treatment of intermittents, it is still much resorted to as a valuable adjunct. It is also frequently prescribed in those conditions of the system attendant on, or following febrile diseases, where a tendency to sink manifests itself, and the system requires support; yet will not support active stimulation. It has also been found useful in exanthematous affections, where the eruption is tardy in its appearance, or has been repelled, in restoring a due action to the functions and organs. Dr. Chapman, (*Elem. Therap.* ii. 421) speaks highly of its powers in the secondary stages of pleurisy and other thoracic complaints. He also states that in infusion it is well calculated to check vomiting, and to tranquillize the stomach. It has also acquired some reputation in certain forms of dyspepsia, given in the form of cold infusion or tincture, but does not appear to be at all superior to the other stimulating tonics, for this purpose. The dose of the powder is from ten to thirty grains; of the infusion (℥j. to the pint of water), which is the best and most general method of giving it, one to two fluid ounces may be given as often as occasion may require. The tincture, which possesses all the properties of the root, may be given in doses of one to two fluid drachms.

As before stated, numerous other species of Aristolochia have been and are still used in different parts of the world as tonics, alexipharmics, &c. It would be impossible to notice these, except in a cursory manner, without extending this article beyond all due limits.

A. sipho, a native and tall vine, closely allied in its characters to *A. tomentosa*, and well known under the name of "Dutchman's pipe," from the peculiar shape of its flowers, has an aromatic and stimulant root, which may be used as a substitute for Serpentaria, but is not equal to it in power.

A. clematitis. A perennial species found in the temperate and warmer parts of Europe; it at one time enjoyed a high reputation as a febrifuge and emmenagogue, but has fallen into disuse. The part employed was the root, which is long, cylindrical, fibrous, contorted, of a faint and somewhat disagreeable smell, and acrid, bitter, and astringent taste. According to Orfila, when given in large doses, it exercises an acro-narcotic influence. (*Toxicol.* ii. 277.) In Russia, it is stated by Pallas, that the leaves are esteemed in intermittent fevers. The root formed one of the ingredients of the celebrated Portland powder, once considered as a specific in gout.

A. pistolochia.—This plant is also indigenous to Europe. The root is formed of numerous slender fibres, and has an aromatic and agreeable odour, and an acrid bitter taste. It is somewhat like Serpentaria in its action on the system, and is given in the same class of cases.

A. longa and *A. rotunda* differ from the above in having thick, somewhat succulent roots. They are almost identical in their properties, and are much used by the French and German practitioners as emmenagogues and anti-arthritics, and enter into a great number of officinal preparations. They have an unpleasant odour when fresh, which in a great measure disappears on drying; their taste is acrid and nauseous. They are tolerably energetic stimulants, in doses of about two drachms. Cadogan (*Treat. on Gout*) says that he has seen the *longa* produce unpleasant consequences, when incautiously given, before the reduction of arterial excitement. According to Lassaigne (*Jour. Pharm.* vi. 565), this root contains much ulmine.

A. trilobata, a native of tropical America, has the odour of the *Prunus padus*, and is said to be superior in medical virtues to the Serpentaria. Linnæus speaks of it in his Materia Medica as an excellent alexiteric. The part employed is the twigs, which are officinal in some of the foreign pharmacopœias. The *A. anguicida*, also a South American species, is said by Jacquin to be eminently alexipharmic, and to exert so powerful an influence on snakes, that a small quantity of the juice of the root introduced into the mouth of a snake, stupefies it to such a degree, that it may be handled with impunity, and in a larger dose will destroy it. Murray says, that the bruised root applied to a snake-bite, or the administration of a decoction of it, will prevent any ill consequences. (*Appar. Med.* i. 516.) Lindley is of opinion, that this is the celebrated Guaco of the Colombians, of the supposed efficacy of which as an antidote, so much has been said by Humboldt and others, and states, that a leaf of this, or a closely allied species, was given to him by Dr. Hancock as the genuine article. (*Veg. King.* 794.) The same properties are attributed to the *A. cordifolia* in Colombia, of which it is a native. (Humb. *Nov. Gen.* ii. 149.)

The *A. bilobata*, a native of Brazil and the West Indies, is there used as an emmenagogue, and even its root introduced into the vagina to induce a more speedy expulsion of the fœtus. (Descourtilz, *Fl. Med. Antill.* ii. 5.) An infusion of the dried leaves of the *A. bracteata*, a native of India, is given by the native physicians, as an anthelmintic, in doses of ʒij. daily; and the fresh plant, bruised and mixed with castor oil, is used as an external application in obstinate psora. (Ainslie, *Mat. Ind.* ii. 5.) Another Indian species, the *A. indica*, is stated by the writer just quoted, to be emmenagogue and anti-arthritic, and Thunberg says, that in Ceylon it is considered to be stomachic and carminative. The *A. sempervirens*, inhabiting Arabia, is there employed, according to Forskäl, in bites of poisonous snakes and wounds of tendons; the part used is the leaves, of which a decoction is made with milk. (*Flor. Egypt.* 157.)

In South America, almost all the numerous species there found have been

employed; besides those already noticed, the following are much esteemed: *A. fragrantissima* of Peru, the bark much used in fevers in scruple or half drachm doses; it is compact, of an ash-gray colour externally, and reddish within; has a camphorated odour, and a pungent, aromatic taste. It is also said to be emmenagogue and alexipharmic. (Alibert, *Mat. Med.* iii. 71.) Several of the Brazilian species, as the *A. cymbifera*, *ringens*, *galeata*, *labiosa*, *&c.*, are highly stimulating; the roots have a strong, disagreeable smell, not unlike that of Rue, and a powerful bitter, yet aromatic taste; they are in general use, in their native country, in nervous and intermittent fevers, dyspepsia, &c., and externally as applications to indolent ulcers. (Chernoviz, *Formulario*, 152.) A variety of others are noticed by Kunth, Ruiz, and other writers on South American plants, as having analogous properties.

Order 84.—SANTALACEÆ.—*R. Brown.*

Calyx superior, 4—5 cleft, half-coloured, valvate in æstivation; its base lined by a fleshy disk, the edge of which is often lobed. Stamens 4—5, opposite the segments of the calyx, and inserted into the edge of the disk. Ovary 1-celled, with from 1—4 ovules, fixed to a central placenta, usually near the summit; style 1; stigma often lobed. Fruit 1-seeded, hard and dry, and drupaceous, indehiscent, crowned with the limb of the calyx. Albuminous; embryo minute, axile, inverted.

This order consists of trees or shrubs, or under-shrubs and even herbs, with alternate or nearly opposite leaves; sometimes small, and resembling stipules. The flowers are usually small, in spikes, seldom in umbels or solitary. The smaller species are found in Europe and North America; the larger in the Polynesian Islands, New Holland, and the East Indies. The most important product is Sandal-wood, so much prized in China as an incense, and also employed for toys, &c., on account of its pleasant odour. This is obtained from several species of *Santalum:* that of India, Timor, &c., being from *S. myrtifolium;* that of Hawai from *S. paniculatum;* and that from the Sandwich Islands from *S. freycinetianum.* The powdered wood of the first is considered beneficial in India in fevers, from its supposed sedative and cooling qualities; it is also used in gonorrhœa, &c.

Fig. 229.

S. myrtifolium.

An infusion of the leaves of *Myoschilos oblongus* is employed like senna, as a purgative in Chili. Every part of *Leptomaria billardieri*, a native of Tasmannia, is acid and somewhat astringent. The fruit of *Fusanus acuminatus* is used in New Holland as a substitute for almonds, and that of *Cervantesia tomentosa* for the same purpose in Peru. The nut of *Hamiltonia oleifera* affords much oil.

Group XXXV.—Chenopodales.

Order 85.—PHYTOLACCACEÆ.

Calyx of 4 or 5 imbricated leaves, sometimes resembling petals. Stamens hypogynous or nearly so, either indefinite, or if equal to the divisions of the calyx, alternate with them; anthers 2-celled, with a longitudinal dehiscence. Carpels solitary or several, dis-

tinct or partially combined; each containing 1 ascending ovule, either amphitropal or campylotropal; styles and stigmas equal in number to the carpels. Fruit baccate or dry, indehiscent. Seeds solitary, ascending, with a cylindrical embryo, curved round mealy albumen; radicle next the hilum.

These are all under-shrubs or herbs, with alternate, entire, exstipulate leaves, often with pellucid dots. The flowers are racemose, regular, or irregular, and variously arranged. They are natives of both Americas, Africa, and India. Their general character is acridity.

PHYTOLACCA.—*Tournefort.*

Calyx 5-parted, coloured, permanent. Stamens and styles 10 or more. Fruit depressed, furrowed; 10- or more celled, covered with a succulent pulp. Seeds solitary.

A small genus, mostly peculiar to America, but few species being found in other parts of the world.

P. DECANDRA, *Linn.*—Leaves acute at each end; flowers with 10 stamens and 10 styles.

Linn., *Suppl.* 631; Bigelow, *Med. Bot.* 1, t. 3; Barton, *Veg. Mat. Med.*, ii. 213; Lindley, *Med. Flor.* 351.

Common Names.—Poke-weed; Jalap; Garget; Cocum, &c.

Description.—Root very large, mostly branched, fleshy; stems annual, from six to eight feet high, round, smooth, much branched, green when young, but becoming purplish as the plant advances in age. Leaves scattered, petiolate, ovate-oblong, smooth on both sides, entire, acute at each end. Flowers on long pedunculated racemes, opposite to the leaves. Peduncles nearly smooth, angular, ascending. Pedicels divaricate, sometimes branched, green, white, or purple, having a linear bract at base, and two others at the middle. Calyx greenish-white, consisting of 5 round-ovate, concave, incurved sepals. Stamens 10, somewhat shorter than the sepals, whitish, rounded, with 2-lobed anthers. Ovary round, depressed, 10-furrowed. Styles 10, short and recurved. Berries in long clusters, dark purple, depressed, marked with 10 furrows on the sides.

Fig. 230.

P. decandra.

The Poke is found in most parts of the United States, and is naturalized in some places in Europe and Northern Africa. It flowers in July and ripens its fruit in the autumn. The shoots, when they first emerge from the ground, are used as a substitute for Asparagus, but when they have attained any size are apt to act on the bowels. The ashes of the stem and leaves contain a large proportion of potash, which in the plant is in union with an acid very similar to the malic; in consequence of this abundance of alkali, and the supposed detergent properties of the plant, the author of the notes to the Pictorial Bible (i. 161), suggests that this plant or one of its kindred species is the Hyssop of Scripture.

The parts used in medicine are the leaves, berries and root, the two latter of which are officinal. These berries are succulent, and contain much purple juice. They have a sweetish, nauseous, somewhat acrid taste, and a peculiar though faint odour. The colouring matter is exceedingly changeable, and hence cannot be applied to purposes of dyeing. Some years since I made many hundred trials to discover a mordant for this purpose, but failed in them all; the nearest approach to fixing it being with the juice of the Crab apple, but in all cases it changed to a dirty brownish-red. The root as brought to market is in transverse slices, of a whitish-brown externally, somewhat wrinkled, and showing on the internal cut surface, numerous concentric rings; when fresh, these rings are alternately light-brown and yellowish-white, but change to a general shade of brown, when the root has been kept for some time. The taste is somewhat sweetish, followed by a sensation of acrimony. When the root is fresh, it has an odour resembling that of Ginseng (*Donnelly*), which it loses by age. From an analysis by Mr. E. Donnelly (*Am. Jour. Pharm.* ix. 165), it appears to contain, Gum Resin, 2·62; Starch, 20; Potash, 2; a small quantity of fixed oil, &c., and 66·5 of woody fibre.

Medical Uses, &c.—The leaves are somewhat purgative, but are principally used in domestic practice as a dressing to ulcers. The root is an exceedingly active emeto-cathartic, and also displays some narcotic powers, and in large doses causes most of the symptoms of the acro-narcotics. Mr. Donnelly states that he has known it to cause all the effects of a severe coryza, on a person powdering it, accompanied with headache, purging, and prostration of strength. It has been proposed as a substitute for Ipecacuanha, but its tendency to act on the bowels, and its slowness of operation, militate against its use. It has been given in small doses, as an alterative in chronic rheumatism. Drs. Jones and Kollock, of Savannah, state that it is an effectual remedy for syphilis in its various stages, and is also very beneficial in rheumatism and chronic eruptions, (Coxe, *Dispen.*) The extract of the root, or of the whole plant, according to Dr. Shultz (*Inaug. Diss.*), is highly useful in the cure of scabies and herpes, and in syphilitic rheumatism is more beneficial in allaying pain than opium. This extract is also employed in domestic practice, in the treatment of indolent ulcers, and as a dressing to ulcers.

From the berries an extract or tincture may be made, the first of which has attained some celebrity in rheumatism, and the extract has, it is said, been beneficial in scrofula, and as an external application to cancerous sores. An ointment, made by mixing a drachm of the powdered leaves or root with an ounce of lard, has proved of advantage in obstinate cutaneous affections. It has also been asserted on good authority, that a strong infusion of the leaves is an admirable remedy in hemorrhoids. It is to be given internally and by injection.

The dose of the powdered root as an emetic is from ten to thirty grains; as an alterative, from one to five grains. That of the tincture about f3j., three or four times a day.

Order 86.—CHENOPODIACEÆ.—*Lindley.*

Calyx deeply divided, sometimes a little tubular at base, persistent, with an imbricated æstivation. Stamens as many as lobes of calyx, or fewer, inserted at their base. Ovary, with a single amphitropal ovule, attached to the base of the cavity. Style rarely simple, in 2—4 divisions; stigmas undivided. Fruit membranous, not valvular, sometimes baccate. Embryo annular or horse-shoe shaped, surrounding the albumen; or in a flat spiral, separating two masses of albumen, or conically spiral without albumen.

The plants of this order are some of them unisexual and some bisexual, and have very different seeds, and hence it is probable that it will have to be divided. The species now included in it, however, correspond closely in general habit; they are chiefly herbs, rarely under-shrubs, with alternate, exstipulate, more or less fleshy leaves, and small flowers. They are found in all parts of the world, but mostly in extra-tropical regions, and frequently in salt marshes.

Some of them are used as pot-herbs, as the Spinage, Lamb's quarters, and Chard; and the roots of others form valuable articles of food, as the Beet, in one variety of which the juice abounds so much in saccharine matter, as to be largely used in France for the manufacture of sugar. The seeds of several species of *Atriplex* are said to be emetic, but the leaves of most of them are edible. All the species of *Salsola*, *Salicornia*, &c., afford soda. *Camphorosma monspeliaca* is stated by most writers to exhale the odour of Camphor, but this is denied by Pallas, and by Merat and De Lens. It was formerly used in the south of Europe as a diuretic, sudorific, and expectorant, but is now abandoned. *Halogeton tamariscifolium*, or Spanish worm-seed, has much the same properties as *C. anthelminticum*. *Thelygonum cynocrambe* is a sub-acrid plant, and is slightly purgative.

Chenopodium.—*Linn.*

Calyx inferior, 5-parted, segments ovate, concave; 5-angled. Stamens as many as the lobes of calyx, and opposite to them; filaments subulate; anthers of two round lobes. Ovary orbicular, depressed. Styles two, rarely three, short; stigmas obtuse. Seed one, lenticular, horizontal, covered by a thin, membranous utricle, and invested by the permanent calyx.

It is principally a European genus, growing in waste places. None of the species have any beauty; they are herbaceous, and many of them have succulent and edible leaves, which form a good substitute for Spinage, sometimes, however, acting gently on the bowels. Those growing in salt marshes may be used for making soda. Some of them are possessed of a strong and peculiar smell, and are possessed of important medical properties. Most of these were classed by the earlier botanists under the name of *Botrys*, but were included by Linnæus in Chenopodium; latterly, however, they have again been separated by *Spach*, under the name of *Ambrina*, and they certainly are sufficiently distinct to constitute a peculiar genus. This example of Spach would now be followed, were it not that the principal medicinal species is so well known under its former name, that it would lead to confusion to attempt a change at present.

C. anthelminticum, *Linn.*—Leaves oblong-lanceolate, sinuate, dentate, rugose. Styles three.

Linn., *Sp. Pl.* 320; Pursh, *Fl. Am. Sep.* i. 198; Barton, *Veg. Mat. Med.* ii. t. 42; Rafinesque, *Med. Flor.* i. 103, t. 21; Lindley, *Flor. Med.* 348; Griffith, *Journ. Phil. Coll. Pharm.* v. 177.

Common Names.—Wormseed; Stinkweed; Jerusalem oak, &c.

Fig. 231.

C. anthelminticum.

Description. — Root perennial and branched. Stem upright, herbaceous, much branched, deeply grooved. Branches fastigiate. Leaves nearly sessile, alternate, and scattered, oblong-lanceolate, deeply sinuate or dentate, studded beneath with small, globular, oily dots. Flowers of a yellowish-green colour, in long, slender, axillary, or terminal racemes. Calyx with five oval, concave segments. Stamens opposite the lobes of the calyx, and about as long. Styles three, sometimes two, longer than the stamens. Seed small, lenticular, covered by the persistent calyx.

It is found in most parts of the United States, most abundantly, and of a larger size to the south. It has become naturalized in some parts of Europe. Rafinesque is of opinion that two distinct species have been confounded under the name of *anthelminticum*, and has given the name of *rugosum* to the southern plant, which, however, does not appear to differ, except in having a more vigorous growth.

The whole plant has a strong, heavy, disagreeable odour, depending on the presence of a volatile oil, which is most abundant in the seeds. This oil is of a light yellow colour, when first extracted, but becomes darker by age and exposure to light. It is usually obtained from the seeds, but sometimes the whole plant is used. The vermifuge properties of this species of Chenopodium and its oil, were discovered soon after the settlement of this country; the first trials of it were made in Virginia, and it is spoken of by Schœpf, Kalm, and others with various degrees of commendation. Its anthelmintic qualities are generally admitted, and it is recognised in all the standard works on Materia Medica.

Medical Uses.—It is usually classed among the vermifuge remedies, and is employed for this purpose alone, in this country; but from the success obtained by Plenck with the *C. ambrosoides* in chorea, it is more than probable that the *anthelminticum* would be found of still more benefit, from its superior powers. As an anthelmintic, it is administered in a variety of forms: as the expressed juice of the whole plant, an electuary of the seeds, a decoction of the leaves in milk, and the essential oil. The disadvantages attendant on the whole of them are their nauseous taste and smell, which renders it very difficult to induce children to swallow them.

When the expressed juice is given, it should be prepared as near the time at which it is to be administered as possible, as it loses much of its efficacy by keeping. The dose is a tablespoonful evening and morning. The decoction

in milk is made by boiling the leaves in new milk; the dose of this is about a wineglassful. To form the electuary, the seeds are to be pulverised and well mixed with honey or syrup. The best form is the essential oil, as this has the active properties of the plant in the smallest compass, and at the same time is not more offensive to the taste or stomach, than the other preparations. The dose for a child of two years of age is from five to ten drops, three times a day, increasing the quantity in proportion to the years. The best mode of administering it is to drop the oil on a lump of sugar, which is then to be grated into water. Care must be taken in very young children not to make the dose too pungent and acrid. After taking it some time, a dose of castor oil should be administered. Kalm speaks of a tincture being employed with much advantage.

Two closely allied species, *C. ambrosoides* and *C. botrys*, have somewhat the same properties, but are not as powerful, and are seldom or never used as anthelmintics. The first has been favourably spoken of by Plenck and others as an antispasmodic, and the latter is reported by French physicians to be a valuable expectorant in catarrh. *C. olidum*, a native of Europe, has a very nauseous odour, and has obtained some reputation as an antispasmodic and expectorant, but is not employed in regular practice. *C. baryosmon* resembles the last, in odour and properties. *C. quinoa* is a common article of food in Peru.

Order 87.—POLYGONACEÆ.—*Lindley.*

Calyx free, often coloured, with an imbricated æstivation. Stamens definite, and inserted on the calyx; anthers with a longitudinal dehiscence. Ovary free, usually formed by the cohesion of three carpels; 1-celled, with a solitary, erect ovule, having the foramen at top; styles or stigmas as many as carpels. Fruit usually triangular, naked, or protected by the calyx. Albumen farinaceous; embryo curved or nearly straight, generally on one side, rarely in the axis.

A numerous and important order, consisting mostly of herbaceous plants, rarely shrubby. The leaves are alternate, with stipules forming sheaths round the stems. Flowers, occasionally unisexual, often in racemes. The species are found in most parts of the world. Their properties are various: some have purgative roots, as the Rhubarb, and some Docks; some are astringent, as Coccoloba; others acid, as in some species of Sorrel; and others, again, acrid and caustic, as in many of the Polygonums. The root of *Calligonum pallasii*, a leafless plant, found in Siberia, furnishes a gummy nutritious substance, like Tragacanth, whilst the branches and fruit are acid. The fruit of *Muhlenbeckia adpressa* have a sweetish taste, and are used in Australia.

Rheum.—*Linn.*

Calyx petaloid, 6-parted, marcescent. Stamens about 9, inserted on the base of the calyx. Styles 3, reflexed; stigmas peltate, entire. Fruit, a triangular, winged achenium, with the withered calyx at the base. Embryo in the centre of the albumen.

This is a very important genus, as some of the species afford the purgative root so well known as Rhubarb, but which of them, has not been ascertained with certainty, notwithstanding the numerous researches made for that purpose. The name is derived from that of *Rha* or *Rheon*, applied by Dioscorides to a root growing beyond the Bosphorus, and at one time generally supposed to be the modern Rheum, but his description does not apply to any species of this genus yet discovered. Pliny speaks of the same under the

name of *Rhacoma*, and says it has a hot, astringent taste. Prosper Albinus thinks that the root noticed by Dioscorides was that of the *R. rhaponticum*, which was obtained by him in Thrace, and cultivated in Persia. It was, however, known to Paulus Æginetus and others, and appears to have been familiar to the early Arabian writers, one of whom, Mesue, speaks of three kinds, differing in quality.

Notwithstanding this early use of Rhubarb, there is as much ignorance respecting the plant or plants producing it, as when it first came into notice; all that science has accomplished is rather to have ascertained by what species it is not afforded, than to point out those that do. The species inhabit the great plains of Tartary, the steppes of Siberia, and the great ranges of mountains lying between these and the northern parts of India. Those now known, resemble each other very much in their flowers, and their principal specific differences are to be found in the leaves, and more especially in the footstalks. Those that have been cultivated have become so changed that it is difficult to recognise from what wild species they are derived.

Dr. Royle says, "The Rhubarb of commerce is well known to be brought by the Chinese to the Russian frontier town of Kiatcha, according to the treaty formed between those powers in 1772. The Chinese obtain the Rhubarb produced in China proper, from that part of the province of Shensee, called Kansu, situated between the 35° and 40° N. Lat.; but the best, according to the missionaries, who say it is called Tai-hoang, in the province of Luet-chen, from the mountains called Sue-chan, or of snow, which extend from 26° to 33° N. Lat., and from about 100° to 105° E. Long. That from the latter province probably forms much of what is called Chinese Rhubarb; the missionaries met large quantities of it, brought down in the months of October and November. That from Kansu may afford some of what is called Russian Rhubarb; but both Pallas and Rehman have ascertained that the greater portion, if not the whole of this, is obtained in April and May, from the clefts of rocks in high and arid mountains surrounding Lake Kokonor. Bell also learnt that it was the product of Mongolia, and Marco Polo of Succuir in Tanguth. Dr. Rehman ascertained that the trade is in the hands of one Bucharian family, who farm the monopoly from the Chinese government, and reside at Si-ning, a Chinese town on the very frontiers of Thibet, 3000 versts from Kiatcha, and 20 days' journey from Kian-Sin and Sehansin, Tangutian towns, where the Bucharians go to purchase Rhubarb. This would bring the Rhubarb country within 95° E. Long., and 35° N. Lat., that is, the heart of Thibet." (*Illus. Him. Bot.*) He goes on to say, that as no naturalist has visited this part, and neither plants nor seeds have been obtained thence, it is as yet unknown what species yields the Rhubarb. In this opinion he is supported by Sievers, sent by the Russian government to investigate the subject; and still more recently, Calau the apothecary at the Russian factory at Kiatcha states all that is known of the Rhubarb plant is erroneous, and that neither the true plant nor its seed have ever been obtained.

The following species of Rhubarb are all that are known as possessing any properties entitling them to notice, according to Dr. Lindley, from whose account of them, with those of Royle, Pereira, and Guibourt, the present synopsis of them is drawn up.

* *Having spike-like racemes.*

1. R. SPICIFORME, *Royle.*—Leaves thick, leathery, cordate, blunt, red, and reticulated beneath, and covered with stellate down on each side. Petioles and peduncles smooth. Racemes arising from the root, spicate.

Royle, *Illus.* 318, t. 78; Lindley, *Flor. Med.* 355.

Inhabits the northern face of the Himalayas, also in Thibet. Dr. Royle says that Rhubarb sent Mr. Moorcroft, from near Ludak, was of excellent quality; and it is suggested by Dr. Lindley that it is not improbable that it may have been furnished by this species.

2. R. MOORCROFTIANUM, *Royle.*—Petioles deeply furrowed, with stipules as long as the petioles, and much more membranous. The imperfect rudiments of leaves (scales) at the base are even longer than the stipules, and are very thin and much torn. Leaves clothed with a short scabrous pubescence.

Royle, *Illus.* 318; *Mat. Med.* 506; Lindley, *Flor. Med.* 356.

Found at the Niti Pass in the Himalayas, and in Thibet. The root, like that of the last species, is compact, of a bright yellow colour, and is said to be more purgative. Dr. Royle thinks it probable that the commercial species will be found to resemble these two in habit, as they occupy the same kinds of locality.

** *Having compound racemes.*

3. R. EMODI, *Wallich.*—Leaves cordate, acute, dull-green, but little wavy, flattish, very much wrinkled, distinctly rough, with coarse, short hairs on both sides; sinus of the base open, not wedge-shaped, but diverging at an obtuse angle, with the lobes nearly turned upwards. Petioles very rough, rounded-angular, furrowed, with the upper side depressed, bordered by an elevated edge, and much narrower at the upper than the lower end.

Fig. 232.

R. emodi.

Wallich, *MSS.*, Hooker, *Bot. Mag.* t. 3508; Royle, *Mat. Med.* 506; Nees, *Suppl.* t. 31, A. B.; Lindley, *Flor. Med.* 354; Pereira, *Mat. Med.* ii. 273; *R. australe*, Don, *Prod. Fl. Nep.* 75; Sweet, *Fl. Gard.* t. 269.

Inhabits the Himalayas. When this plant was first made known, it was declared, especially by Mr. Don, that it was the species affording the Russia and Turkey rhubarbs; but this was disproved by Dr. Pereira, who found that specimens of the root sent him by Dr. Wallich were widely different from the commercial article. Dr. Lindley, however, says that the roots of both this species and the next are valuable medicines; and Mr. Twining (*Trans. Med. Soc. Calc.* iii. 439) states that he has tried them in many cases, and found them nearly as efficacious a purgative as the best Turkey Rhubarb, less disagreeable to take, but more tonic and astringent. The petioles make excellent tarts.

4. R. WEBBIANUM, *Royle.*—Radical leaves large, long-stalked, cordate, acute; cauline ones obtuse, rather downy above, veiny beneath, and margin hairy. Petioles hairy.

Royle, *Illus.* 318, t. 78; *Mat. Med.* 506; Lindley, *Flor. Med.* 355; Pereira, *Mat. Med.* ii. 273; *R. emodi*, Meisner; Wallich, *Pl. As. rar.* iii. 65.

The properties of this species are the same as the last. It is also found on the Himalayas.

5. R. RHAPONTICUM, *Linn.*—Leaves roundish-ovate, cordate, obtuse, pale-green, but little wavy, very concave, even, very slightly downy on the under side, especially near the edge, and on the edge itself; scabrous at the margin; sinus quite open, large, and cuneate. Petiole depressed, channelled on the upper side, with the edges regularly rounded off, pale-green, striated, scarcely scabrous.

Linn., *Sp. Pl.* 531; Willdenow, *Sp. Pl.* ii. 488; Lindley, *Flor. Med.* 357; Royle, *Mat. Med.* 506; Guibourt, *Hist. Abreg.* ed. 2, 1, 335.

This species is a native of Thrace, Siberia, North of the Caspian Sea, &c. Guibourt says that the root has a very astringent and mucilaginous taste, does not crackle under the teeth, has an odour like that of Rhubarb, but more disagreeable, and its powder is more reddish. It is cultivated for its roots, near L'Orient, in the department of Morbihan. The prepared root is similar to the Chinese article, and forms part of what is called French Rhubarb. It was analyzed by M. Henry (*Bull. Pharm.* vi. 87). It is also cultivated in England for its roots, but more extensively for its stalks, for which latter purpose it is also grown in this country, but not as frequently as some of the other species.

6. R. LEUCORHIZUM, *Pallas.*—Radical leaves about 3, short-stalked, coriaceous, transversely elliptical, scarcely hollowed out at base; with 3, thick, branched nerves projecting very much beneath, smooth on both sides, denticulate at the edge, with here and there a few scattered, roughish warts; no cauline leaves, or scarcely ever one; petioles about an inch long, compressed, solid, with a narrow channel on the upper side.

Pallas, *Nov. Act. Petrop.* x. 381; Ledebour, *Fl. Altai.* ii. 92; Lindley, *Flor. Med.* 356; *R. nanum*, Sievers, *Pall. n. nord. beitr.* vii. 264; *R. tataricum*, Linn., *Suppl.* 229.

Grows in the deserts of Southern Siberia, the Altai Mountains, &c. This is a small species. This is supposed to yield what is called "White Rhubarb;" at least, when Pallas was at Kiatcha, this article, which is said to be equal in its effects to the best kinds, was brought there by the Bucharian merchants, and he supposes that it was the produce of this plant, but Ledebour says nothing of its roots.

7. R. CRASSINERVIUM, *Fischer.*—Leaves heart-shaped, acuminate, wavy, very bullate, deep-green, quite smooth on both sides, rather glossy on the upper; scabrous at the edge; the ribs of a slight red colour, and the central ones very thick at base; sinus open, cuneate, with the lobes inflected. Petiole dull-red, rounded, rather angular, with the upper side narrow and flattened, the edges raised, narrower at point than at base.

Lindley, *Flor. Med.* 359.

Its place of growth is unknown. It was sent from St. Petersburg with this name, and is growing at the Apothecaries' Garden at Chelsea, near London. Dr. Lindley says that roots of it, of three years of age, were as thick as the wrist; and, when examined at Apothecaries' Hall, were found to possess the peculiar odour and colour of the best Turkey Rhubarb.

8. R. CASPICUM, *Fischer.*—Leaves ovate, acuminate, cordate and inflexed at base, very wavy, of a deep green, thick texture, glossy and somewhat even on the upper side, scabrous at the edge, a little downy on the under surface. Sinus somewhat open, lobes rolling inwards. Petioles pale-green, with scarcely a tinge of red, minutely downy, semi-cylindrical, with elevated edges to the flat upper side, which is of equal breadth at both ends.

Lindley, *Flor. Med.* 357; *R. rhaponticum*, Ledebour, *Fl. Altai*, ii. 91.

It is found near the Caspian Sea, and Altai Mountains. Nothing is known of its roots.

9. R. UNDULATUM, *Linn.*—Leaves oval, obtuse, very wavy, deep-green, with the veins purple at base, often shorter than the petiole, downy on both sides, scabrous at the edge. Sinus open, cuneiform, lower lobes turned upwards. Petiole downy, blood-red, semi-cylindrical, with elevated edges on the upper side, narrower at the upper end than at the lower.

Linn., *Sp. Pl.* 531; Willdenow, *Sp. Pl.* ii. 489; Stephenson and

Churchill, t. 177; Lindley, *Flor. Med.* 357; Pereira, *Mat. Med.* ii. 272; Royle, *Mat. Med.* 507; *R. rhabarbarum*, Linn. *Syst. Veg.* 385.

This species grows in Asiatic Russia, and probably in Chinese Tartary. In 1732 it was sent to Jussieu at Paris, and to the Apothecaries' Garden at Chelsea, as the true Rhubarb; and in 1750, Kauw Boerhaave, physician to the Emperor of Russia, obtained seeds from a Tartarian merchant, of what was stated to be the plant producing the Rhubarb of commerce, which on growing, proved to be of both the *R. undulatum* and *palmatum*. It was for some time cultivated by the Russian government, but the product proved so inferior, that the culture has been discontinued, and Guibourt says that he never could obtain good Rhubarb from it. It is, however, raised in France, and its roots constitute a part of French Rhubarb; and Stephenson and Churchill state that what is sold under the name of English Rhubarb is the root of this plant, but Lindley doubts the accuracy of their information, and says the species is but little known in England.

Fig. 233.

R. compactum.

10. R. COMPACTUM, *Linn.*—Leaves cordate, obtuse, much undulated, of a deep-green colour, and thick texture, scabrous on the margin, quite smooth on both sides, shining on the upper surface; sinus nearly closed. Petioles green, scarcely tinged with red except at base, semi-cylindrical, somewhat compressed at the sides; upper side broad, flat, with elevated edges, and of the same size at either end.

Linn, *Sp. Pl.* 531; Willdenow, *Sp. Pl.* ii. 489; Lindley, *Flor. Med.* 358; Nees, 121.

A native of Chinese Tartary. It is cultivated in France, and affords part of the French Rhubarb. Guibourt says this is a pretty good imitation of the Chinese, but when cleared of the yellow powder, its different colour and close radiated marbling distinguish it; it does not crackle under the teeth, nor tinge the saliva of as deep a yellow. This is one of the species principally grown on account of their stalks.

Fig. 234.

R. palmatum.

11. R. PALMATUM, *Linn.*—Leaves roundish-cordate, semi-palmate; the lobes pinnatifid, acuminate, of a dull-green colour, not undulate, but uneven and wrinkled on the upper side, scarcely scabrous at the edge, minutely downy on the under side; sinus completely closed, the leaf-lobes standing forwards beyond it. Petiole pale-green, marked with short purple lines, terete, obscurely channelled at the upper end.

Linn., *Sp. Pl.* 531; Aiton, *Hort. Kew.* ii. 41; Stephenson and Churchill, 25; Lindley, *Flor. Med.* 358.

Grows in Chinese Tartary, Mongolia, &c. As before mentioned, the seeds of this were obtained

with those of *R. undulatum*, as being those of the true Rhubarb plant. Pallas, however, states that he was informed by the Bucharian Rhubarb merchants that they were unacquainted with leaves of a Rhubarb resembling this species, and that those of the plant furnishing the commercial article were round and much cut at the edges. The opinion of writers, however, still leans to the belief that this plant furnishes the true officinal Rhubarb. Pereira says, that having carefully washed and dried the roots of the most of the species noticed in the foregoing pages, he found that of the *R. palmatum* closely resembled the Asiatic Rhubarb, in odour, colour, and marbling, and Guibourt declares of all the cultivated kinds, this species alone has roots which resemble in all parts, the Rhubarb of China. Stephenson and Churchill say that it is cultivated largely in England for the roots, but most certainly what is termed English Rhubarb differs very widely from the Asiatic drug, and Royle states that what is grown at Banbury is the *R. rhaponticum*.

From the foregoing account it will be seen that it is very uncertain to what species of Rheum the Rhubarb of commerce is to be attributed, and that the probability is, that it is not yet known to botanists. It has, however, been ascertained that it principally grows in Chinese Tartary. From the information obtained by Bell, (*Travels*, i. 311,) Du Halde, Sievers, and others, it appears that the roots are dug up during the summer season, and only those plants are selected which are five or six years old. The roots are then cleansed, deprived of their cortical portion, cut into pieces, pierced through their centre, strung upon a cord and dried in the sun. In China it is said the pieces are partially dried on a kind of oven, before they are bored. According to Sievers the drying process is very tedious, and that it is sometimes a year before the root is fit to offer for sale.

There are several kinds of Rhubarb recognised by pharmaceutic writers, as the Chinese, Russian or Turkey, Bucharian, Siberian, Himalayan, English and French, the first two of which are those most generally employed in this country.

Chinese.—This is the sort usually to be met with in the shops, as although not equal to the Russian, still, when of good quality, it answers perfectly well, and can at the same time, be afforded at a much lower price. It is in pieces of various forms, usually cylindrical or rounded, and sometimes flat on one or both sides. Pereira has described three varieties: one he terms *Dutch trimmed;* in this the bark appears to have been cut off, and not removed by scraping; the second, or *Chinese Rhubarb*, is irregular in shape, never angular, but presenting an appearance of having been scraped; the third, or *Canton stick Rhubarb*, is in cylindrical pieces of about two inches in length, and from a half to three-quarters of an inch in diameter. All these are to be met with in our shops, and may be observed in the same parcel. This Rhubarb when good, is rather heavier than the Russian, has a somewhat compact texture, and its fracture is uneven; the veins especially towards the centre are not regular, and are of a duller colour. It has a peculiar odour, and an astringent somewhat bitter taste, feels gritty when chewed, and tinges the saliva of a yellow colour.

Russian.—This, as previously stated, is delivered to Russian agents at Kiachta, whence it is taken by caravans to St. Petersburg and Moscow. The pieces vary in shape, and are often angular, from the cortical portion having been cut off, and not removed by scraping. They are smooth and of a yellow colour; they are less compact and heavy than the Chinese, of a livelier colour internally. Their fracture is uneven, marbled with white and red veins, which towards the centre assume a radiated form. The taste is rather more aromatic than the Chinese, but the odour is much the same;

there is the same crackling on chewing it, and the same colour imparted to the saliva; the powder is usually of a brighter yellow than in the last variety.

The *Bucharian* Rhubarb seems to be an inferior quality of the Russian. The *Siberian*, which is in cylindrical pieces, is probably the product of *R. rhaponticum*. Of late years, Rhubarbs from *Himalaya* species have been tried in India, and found of excellent quality, and may perhaps hereafter become an article of commerce. The *French* and *English* Rhubarbs are of inferior quality, and are seldom employed in this country, as the Chinese is plentiful and at comparatively a low price.

Numerous analyses of Rhubarb have been made, and it has been found to owe its properties to the presence of *Chrysophanic acid*, which in its impure state has been described by Brandes as Rhabarberic acid, as Rhabarbarin by Geiger, and Rhein and Rheumin by other authors; to a mixture of several resins and Extractive matter; the active principles are taken up by water and by alcohol; with the alkalies it produces a red-coloured solution.

Medical Uses.—Rhubarb is a mild and safe purgative, and at the same time is gently astringent and tonic. Its colouring matter is rapidly absorbed, and tinges the urine and other secretions of a yellow colour. As a purgative it is in general use, and is well adapted to delicate persons and children, where it is wished to evacuate the bowels without exciting an undue action in them. It is much employed in dyspepsia attended with constipation, and forms the basis of most of the preparations known as "dinner pills," &c. It is either given alone or in a variety of combinations, as with soap, to counteract its astringent quality, with magnesia to increase its action, or where acidity exists. When toasted, much of its purgative power is destroyed, but its astringency remains the same.

The preparations of it are very numerous. It is given in powder in doses of from five grains to half a drachm, according to the indication to be fulfilled. The usual purgative dose is from ten to twenty grains. (See *Amer. Dispen.*, Pereira, and Royle.)

Rumex.—*Linn.*

Calyx of three obtuse, spreading, persistent sepals, more or less combined at base, and of three ovate, larger, internal ones, thinner in texture, but of the same colour, finally increased in size and connivent; in some species having a dorsal gland or tubercle. Stamens six. Filaments very short, capillary. Anthers oblong, erect, with two lobes. Styles four, capillary, with large stigmas, in numerous fine, tufted segments. Nut triangular, superior, naked. Embryo oblong, on one side of the albumen.

An extensive genus, found in Europe, the temperate parts of Africa, and in the United States. The species have terminal or axillary paniculate flowers, and in some cases are monœcious or dicœcious. The roots are generally large and fleshy, and are usually astringent, but sometimes purgative. *R. crispus*, a native of this country, is said to be useful in decoction or ointment, in the treatment of itch; the part used is the root; that of *R. obtusifolius* has the same properties, and that of *R. patientiæ* is much employed in France as a depurative remedy in cutaneous disorders, scurvy, &c.; it is also considered to be tonic and stomachic. The leaves of this and several other of the species are used as greens; *R. sanguineus* is also thought to be useful as an astringent in hæmorrhagies, and that its juice was a beneficial application to cancerous ulcers.

The most active species is unquestionably *R. alpinus*, a native of the moun-

tainous parts of Europe. The root is large, fleshy, and purgative like Rhubarb. Although at one time in much use, especially among the inmates of monasteries, whence its name of "Monk's Rhubarb," it is now seldom or never employed; and Merat and De Lens are of opinion that its powers are very feeble; Linnæus, however, took it for a variety of *Rheum rhaponticum*.

Several of the plants of this genus have acid leaves, owing to the presence of oxalic acid; among these are *R. acetosa*, *R. acetosella*, and *R. vesicarius*. The first of these is much used as a culinary vegetable in France, and is esteemed very wholesome. Its employment for this purpose is of very ancient date, as Pliny speaks of it as rendering animal food easier of digestion. They are all cooling and aperient, and somewhat diuretic; but are prejudicial when too freely or frequently eaten, from the quantity of oxalic acid they contain. This is extracted in Switzerland, and forms part of the oxalic acid of commerce; it is said that it requires fifty pounds of leaves to produce two and a half ounces of pure acid. A decoction of the leaves is much employed in France as a depurative remedy, especially in the spring.

Polygonum.—*Linn.*

Calyx turbinate, coloured, with five deep, ovate, obtuse, persistent segments. Stamens 5—8, very short, subulate. Anthers roundish, incumbent. Ovary roundish, somewhat triangular or compressed. Styles usually three; in those with a compressed ovary, two, filiform, short. Stigmas simple. Nut solitary, either triangular or compressed, pointed. Embryo enveloped in a farinaceous albumen.

Almost all are herbaceous, with alternate leaves, sheathing at the base, and varying much in shape in the different species; furnished with ochreæ. Flowers axillary or terminal, usually spiked. Peduncles articulated. Stems and branches often nodose, but not articulated. The species are polymorphous, and require revision. They are principally natives of Europe and North America; some few are found in the eastern parts of Asia. They differ as widely in their medical properties as they do in their botanical characters, some being astringent, others very acrid, whilst others afford farinaceous and edible seeds. The most important species of the first class is *P. bistorta*, a native of the north of Europe and America. It usually grows in damp situations, and has a creeping, fleshy, or woody root, which is powerfully astringent; this has been employed with benefit in all cases requiring the use of this description of remedies, and has also been recommended in combination with one of the pure bitters in intermittents. It contains much tannin and gallic acid; it also abounds in fecula, and is used in Siberia for food, after being roasted. The fibrous root of *P. aviculare* is also said to be astringent, and was at one time much esteemed as a vulnerary. The seeds are emeto-cathartic; this property, so unusual in the genus, is thought by De Candolle to reside in the testa. *R. tamnifolium* is employed in some parts of South America as an astringent in hemorrhages.

The acrid species are very numerous; but those which have been most generally employed are *P. hydropiper* and *P. persicaria*. The leaves of both these are very acrid and pungent, and will even vesicate when applied in a fresh state to the skin. Like most acrid plants, they become inert by desiccation. Many marvellous qualities have been attributed to the last of these species by the writers of the middle ages; that it was capable of changing the seat of disease from one part of the body to another, &c. At a much more recent period, some of the most eminent writers in the profession

have considered it to be an admirable astringent, vulnerary, febrifuge, &c., and Baglivi states that it is a specific in diseases of the kidneys and bladder; notwithstanding which, it is now seldom prescribed in regular practice. *P. hydropiperoides* of this country, which is closely allied, if not identical, with the former of these, has been highly spoken of by Dr. Eberle (*Therapeut.*) in obstinate cases of amenorrhœa, and has also proved beneficial in the hands of other practitioners in similar cases. It is given in the form of a saturated tincture.

Fig. 235.

P. persicaria.

The roots of some of these plants have been thought to possess the qualities of Sarsaparilla, and have been used as a substitute for it; thus *P. amphibium* is said by Coste and Willemet (*Mat. Med. Indig.* 116) to be much esteemed in Lorraine as a depurative, and even to be preferred to the foreign article. In Brazil, according to Martius, *P. anti-hæmorrhoidale* is in high repute in the treatment of gout, hæmorrhoids, &c. It is used in baths, fomentations, and cataplasms (*Jour. Chim. Med.* iii. 545). Thunberg (*Voyage*, i. 338) states that *P. barbatum* is considered at the Cape of Good Hope to be beneficial in dropsy, on account of its diuretic properties; and an infusion of its leaves is prescribed in India to relieve the pain in colic (*Ainslie*, ii. 2).

Those furnishing nutritive seeds are principally *P. fagopyrum* and *P. tataricum*, both well known under the name of Buckwheat. These plants, with some others, have been erected into a separate genus, under the name of *Fagopyrum*. They are principally natives of the central and northern parts of Asia. Buckwheat was introduced into Europe about four centuries since, and, according to Gerarde, was cultivated in England in 1597. In some parts of Europe Buckwheat is much used as food; this is the case more particularly in some of the departments of France. In this country, although much esteemed for breakfast-cakes, it is never made into bread. It is likewise employed in some parts of Germany for the making of beer. It is not as nutritive as the cereal grains, containing only one-half its weight of fecula. *P. convolvulus*, *P. scandens*, &c., which are climbing species, bear seeds closely resembling those of Buckwheat, and which might be substituted for them. The seeds of *P. emarginatum* are eaten in China.

Fig. 236.

P. fagopyrum.

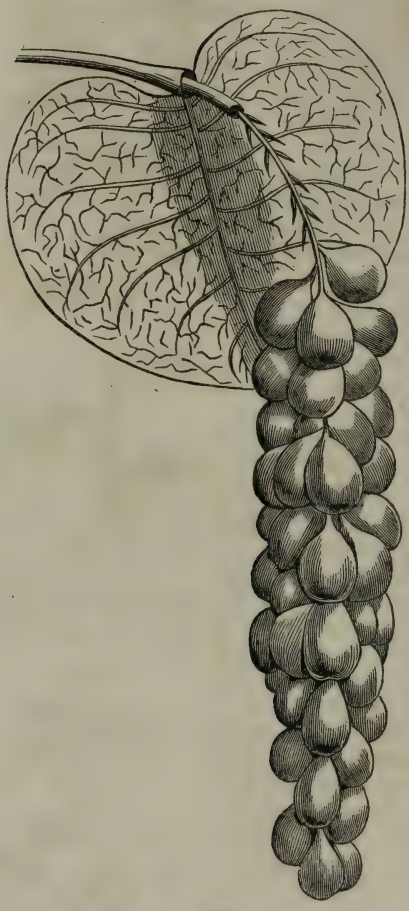
The roots of a few of the species are likewise alimentary; thus in Japan those of *P. multiflorum* are eaten in a raw state, and are considered cordial and strengthening. When cooked they become bitter (*Thunberg*, iv. 83). According to Pallas, the tubercles of *P. sibiricum* also form an article of diet.

The leaves of almost all these plants furnish a kind of indigo, and some of them have been extensively employed. *P. tinctorium* is largely cultivated

for this purpose in some parts of Europe, and is very generally used in China and Japan.

Coccoloba.—*Linn.*

Fig. 237.



C. uvifera.

Calyx 5-parted, persistent, finally becoming succulent. Stamens 5, united below, inserted on the base of the calyx. Styles 3. Stigmas simple. Nut 1-seeded, bony, covered by the enlarged, succulent calyx. Embryo in the middle of the albumen.

A genus of shrubs and small trees, peculiar to South America and the West Indies, with entire, large leaves. The calyx in them all, is permanent, and at last becomes succulent, and envelopes the seed, so as to resemble a small grape. The wood and bark contain an astringent juice.

C. uvifera.—Leaves roundish-cordate, smooth.

Linn., *Sp. Pl.* 523; *Bot. Mag.* 3130; Sloane, *Jamaic.* ii. 129, t. 220; Lindley, *Flor. Med.* 353.

A small tree, inhabiting the coast of South America and the West India Islands. In Jamaica, where it is common, it is called "Seaside Grape." The leaves are very large, coriaceous, entire, cordate, of a bright and glossy green, with the veins red, especially at their base. The fruit, which is eatable, though not much esteemed, is in long bunches, somewhat like those of the vine. It is acidulous, and somewhat astringent, and is said to be beneficial in bowel complaints.

The wood is heavy, of a dark colour, and contains an astringent, reddish juice, which, when evaporated, forms what is termed *Jamaica Kino*. This is reddish-brown, approaching to black, opaque in the mass, but translucent and of a ruby-red colour when in thin splinters. It has no odour, but an astringent, bitterish taste. The *Caraccas Kino* is probably the product of some of the other species of Coccoloba, all of which are equally astringent.

The fruit of *C. nivea* and *C. pubescens* are much more agreeable than those of the present plant.

Group XXXVI.—Daphnales.

Order 88.—LAURACEÆ.—*Lindley.*

Calyx 4—6-cleft, with an imbricated æstivation, the limb sometimes wanting. Petals none. Stamens definite, perigynous, opposite the segments of the calyx, and mostly twice as numerous; the innermost sterile or deficient, the six outermost seldom abortive. Anthers adnate, 2—4-celled, cells bursting by a longitudinal persistent valve; the outer anthers valved inwards, and the inner valved outwards, or all with the valves on the inner side; inner filaments usually having glands at base. Ovary superior, 1-celled, with 1—2 single, pendulous ovules. Style simple. Stigma obtuse, 2—3-lobed. Fruit baccate or drupaceous, naked or covered, often placed upon or within the enlarged apex of the peduncle. Seed exalbuminous. Embryo inverted. Radicle very short, superior.

An important order, composed of trees and shrubs, with exstipulate, alternate, seldom opposite, entire or rarely lobed leaves. The flowers, which are perfect, unisexual, or polygamous, are in panicles or umbels. They are principally natives of cool situations within the tropics; some few, however, extend beyond these limits. They are all more or less aromatic and fragrant; some have aromatic fruits, others have fragrant and stimulant or febrifuge bark, whilst others afford Camphor.

Besides those to be noticed more particularly, the following deserve mention: *Persea gratissima* bears a large fruit, highly esteemed in the West Indies, under the name of "Avocado pear;" the seeds are very astringent, and have proved beneficial in diseases of the bowels and menorrhagia. The leaves and buds, according to M. Ricord Madiana (*Jour. Pharm.* xv.), are employed as emmenagogues, carminatives, vulneraries, antispasmodics, &c. Dr. Lindley is of opinion, that the *Laurus caustica* of Molina, which is said to be so acrid and poisonous, is a species of this genus. *Caryodaphne densiflora*, a native of Java, is stated by Blume (Nees, *Laurin.* 228) to have a brownish, tonic bark, containing much bitter, balsamic extractive. The leaves are aromatic, and used in infusion in spasmodic affections of the bowels, and in convulsive attacks of pregnant women. The inner bark of *Mespilodaphne pretiosa* has a very agreeable odour and taste, and is known in Brazil as the *Casca pretiosa.* Several species of *Aydendron* have aromatic fruits—thus *A. cujumary*, a native of Brazil, affords oily seeds, which are said, by Martius, to be used as a substitute for the Pichurim bean, in atony of the stomach and disorders of the bowels. (Ferussac, *Bull.* xxiv. 62.) *A. laurel* is thought, by Humboldt, to produce the Pichurim beans, once so celebrated for their febrifuge properties; but Nees is of opinion, that such is not the origin of these seeds, and refers them to *Nectandra puchury*, on the authority of Martius, who says that they are certainly not the product of the *A. laurel.* (*Laurus pichurim*, Rich.)

The bark of *Nectandra cymbarum* is bitter, aromatic, and stomachic; it is called "Orinoko sassafras," from its analogy to the true Sassafras. Martius suspects that it forms one of the ingredients of the famous Woorali poison. The bark of *N. cinnamomoides* has the smell and flavour of cinnamon, and is employed as a substitute for it in some parts of South America, and is known as "Santa Fe cinnamon." Pichurim beans, as before stated, are the product of *N. puchury;* this fruit, which has the flavour of inferior nutmegs, is esteemed in Brazil as very useful in bowel diseases, colic, stran-

gury, &c., but is seldom employed in Europe or this country. The bark of the tree has the smell of fennel and cloves, and an aromatic taste. Another species, *N. puchury minor*, yields somewhat similar nuts, which are said, by Humboldt, to be the Sassafras nuts of the London shops. The bark resembles Sassafras when fresh, but is scentless and tasteless when dry. The most important tree of this genus is *N. rodiai*, which there is reason to believe affords the Bebeeru bark so highly spoken of within a few years past in the treatment of paroxysmal diseases. It owes its properties to the presence of a peculiar alkaloid, to which its discoverer, Mr. Rodie, gives the name of *Bebeeria;* from the trials made with this substance, it promises to be a most valuable addition to the Materia Medica, as it is fully equal to Quinia in its febrifuge powers, and can be sold at a much lower price. (See Dunglison, *New Remedies*, 117.)

The bark of *Dicypellium caryophyllatum* has the odour of cloves, and a hot, clove-like, peppery taste, and is a powerful tonic. The wood is known in Guiana under the name of "Rosewood," and Martius speaks of the tree as the noblest of the American laurels. Several species of *Oreodaphne* are valuable on account of their wood; thus the yellow, durable wood called in Jamaica, "Sweet wood," is that of *O. exaltata;* that known under the name of "Til" in the Canary Islands, and which has an extremely unpleasant smell, is from *O. fœtens;* the "Siraballi" of Demarara is also produced by a species of this genus. The bark of *O. cupularis* resembles cinnamon in its properties, and has been called "Isle of France Cinnamon." Another species, *O. opifera* of Brazil, abounds so plentifully in a volatile oil, that several quarts may be speedily obtained from a single incision. This oil is reputed to be an excellent discutient. The fruit also yields a fragrant oil, much used in Brazil in pains in the limbs, contractions of the joints, &c. (*Martius.*)

The fruit of *Tetranthera roxburghii* contains much fatty matter, which is employed, by the Chinese, as a substitute for tallow in the manufacture of candles. Besides those already noticed, there are several trees of this order that furnish fruits analogous to nutmegs in flavour; thus the *Camara* or *Ackawai* nutmeg is the product of *Acrodiclidium camara*, and is considered in Guiana as a most valuable remedy in bowel diseases. The Clove nutmegs of Madagascar are the fruit of *Agathophyllum aromaticum*, and the Brazilian of *Cryptocarya moschata.* The berries of *Daphnidium cubeba*, originally noticed by Loureiro as a *Laurus*, and not described since his time, are powerfully aromatic, and are used, according to that author, not only as a condiment, but also as an almost universal remedy. (*Flor. Cochin.* 310.)

Laurus.—*Linn.*

Flowers unisexual or perfect, involucrated. Calyx 4-parted; segments equal, deciduous. Fertile stamens 12, in 3 rows; the outermost alternate with the segments of the calyx, all with 2 glands; anthers oblong, 2-celled, looking inwards. Female flowers with 2—4 sterile stamens around the ovary. Stigma capitate. Fruit succulent, seated in the irregular base of the calyx. Umbels axillary.

A small genus of evergreen plants, but which, at one time, included most of the species of the order. As now constituted, it is of little importance in a medical point of view, the only plant belonging to it that is deserving of notice being the *L. nobilis*, or "Sweet Bay." This

small tree, so celebrated by the poets, and so much prized by the moderns for the fragrance and the beauty of its foliage, affords several products, which at one time had considerable reputation as medicinal agents, but are now seldom employed, either in England or this country. The leaves, which are fragrant, and have an aromatic, bitter taste, owe these properties to the presence of a yellowish volatile oil. The berries, by pressure, likewise afford a concrete oil, of a greenish colour, containing sufficient of the aromatic volatile oil to give it an agreeable fragrance. All these parts and their products have stimulating and slightly narcotic properties, but have gone out of use.

Fig. 238.

L. nobilis.

1. Umbel. 2. Single flower. 3. Dehiscence of anther. 4. Ovary and Style. 5. Section of Seed.

Sassafras.—*Nees.*

Diœcious, calyx 6-parted, membranous; segments equal, permanent at base. Male: Fertile stamens 9, in 3 rows, the 3 inner with distinct glands at the base; anthers linear, 4-celled, introrse. Female: stamens as many or fewer than in the male, sterile, the inner often confluent. Fruit succulent, placed on the thick fleshy apex of the peduncle, within the permanent base of the calyx.

A small genus, separated by Nees from Laurus, and differing from it in many important characters. The flowers are yellow, and precede the leaves, which latter are deciduous. The species are peculiar to America and the East Indies.

S. officinale, *Nees.*—Leaves variable in form, downy beneath. Racemes with subulate deciduous bracts.

Nees, *Laurin.* 488; Nees and Esen., *Pl. Med.* t. 131; Lindley, *Fl. Med.* 338; *Laurus sassafras.* Linn., *Sp. Pl.* 530; Mich., *Fl. Am. Bor.*, i. 244; Bigelow, *Am. Med. Bot.* ii. 142.

Common Name.—Sassafras.

Foreign Names.—Sassafras, *Fr., Ger.;* Sassafrasso, *It.*

Description.—A small tree with a rough, deeply furrowed, grayish bark. The leaves are alternate, petiolate, bright-green, and smooth above, finely downy beneath, especially when young, very variable in form, from ovate and entire to three-lobed, all however, tapering to the base. The flowers, which appear before the leaves, are of a pale, greenish-

yellow colour, and are in naked, downy racemes, having subulate, deciduous bracts at their base. The calyx is six-parted, permanent at base. The sterile flowers have nine stamens, the fertile only six, with a simple style. The fruit is an oval drupe of a deep blue colour, supported in the permanent base of the calyx on the thick, red, clavate peduncle.

The Sassafras is found in most parts of the United States, and extends into Mexico. To the north it is a mere shrub, whilst to the south it attains a height of from thirty to fifty feet. Its time of flowering in the Middle States is the end of April or beginning of May. Its flowers have an agreeable, but not a powerful odour, and are much employed in domestic practice, in the form of a decoction, as a "purifier of the blood" in the spring. The officinal portions in the U. S. Pharmacopœia are the bark of the root, and the pith of the young branches; the foreign authorities also recognise the wood.

The *pith* is in slender cylindrical pieces, very spongy and light, with a mucilaginous and somewhat aromatic taste. When placed in water it affords a clear mucilage of a peculiar character, not being affected by alcohol. This mucilage is principally used as an application to inflamed eyes, and is very soothing and effectual in the removal of the irritation so constant in this complaint. It may also be advantageously used in disorders of the respiratory organs, bowels, and bladder, as a demulcent drink. In the bowel complaints of children I think it more efficacious than that prepared from the leaves of the Benne.

The *bark* is usually found in the shops, in small fragments, either having or deprived of the epidermis, of a reddish-brown colour, brittle, of a very fragrant odour, and a sweetish and pleasant aromatic taste. It owes its properties to the presence of a volatile oil, which is of a yellow colour, when first obtained, but becomes darker by age. It is one of the heaviest of the volatile oils.

Medical Uses, &c.—The bark is stimulant and diaphoretic, and is used in combination with other articles as Guaiacum, Sarsaparilla, &c., in cutaneous, rheumatic, and venereal complaints. In the latter class of diseases it was at one time deemed a specific, but is now seldom or never used alone. The oil has been employed in the same maladies, and is a constituent of the compound extract of Sarsaparilla. Dr. B. S. Barton states that it has been found an efficacious application to wens. (*Collections*, i. 19.)

Mr. Nuttall (*Gen.* i. 259), mentions another species under the name of *albida*, which closely resembles the present, and states that the root is of a white colour and much more powerful, and that its leaf-buds are very mucilaginous.

The species spoken of by Martius (*Travels*, ii. 96), as common in the woods of Brazil, is probably a different species, and that noticed by Loureiro (*Flor. Coch.* i. 254) as employed by the natives as a sudorific and diuretic, would seem to be what has since been described by Jack, under the name of *Laurus parthenoxylon*, which is the *L. porrecta*, Roxburgh, and *L. pseudo-sassafras*, of Blume, now placed by Nees in the present genus, under the specific name bestowed upon it by Mr. Jack.

Benzoin.—*Nees.*

Flowers polygamous, involucrated. Fertile, with the calyx 6-parted, the segments equal and permanent. Stamens 9, in three rows; anthers ovate, 2-celled, introrse. Glands 6—9, in two or three rows, with a reniform, compressed head. Sterile flowers smaller than the fertile, with 12 sterile stamens, with spathulate bodies dispersed among them. Fruit succulent, seated on the permanent calyx, 1-seeded.

This small genus was separated by Nees from Laurus, to which, however, it is very closely allied, and should, perhaps, be only considered as a section of it. The flowers are in sessile umbels, appearing before the leaves, which are membranous and deciduous.

B. ODORIFERUM, *Nees.*—Leaves ovate, lanceolate, somewhat pubescent beneath; flowers in clustered umbels; buds and pedicels glabrous. Fruit bright-red, oval, containing an ovate-pointed nut.

Nees, *Laurin.* 497; Lindley, *Flor. Med.* 339; *Laurus benzoin*, Linn., *Sp. Pl.* 530; Barton, *Veg. Mat. Med.* ii. 91, t. 33; Nuttall, *Gen.* i. 259; *L. pseudo-benzoin*, Michaux, *Fl. Bor. Am.* i. 243.

Common Names.—Spice-wood; Fever-bush; Wild Allspice, &c.

This aromatic shrub, which is from 5—10 feet high, is found in most parts of the United States, flowering early in the spring before the appearance of its leaves. They are succeeded in the autumn by oval, shining, scarlet berries, which are ripe in October. These are aromatic and contain much oil. They are said to have been employed during the war of the Revolution as a substitute for allspice. The bark is also highly aromatic, tonic and stimulant, and has been employed with much success in the treatment of intermittent fevers. It has usually been administered in decoction, but sometimes in powder. Dr. B. S. Barton states, that an infusion of the twigs has been given as a vermifuge, and has been very efficacious in such cases. The oil of the berries is also esteemed, in some parts of the country, as an application to bruises, and in chronic rheumatism, itch, &c., and has some reputation as a carminative. The flowers are sometimes used instead of those of sassafras, and for the same purposes.

CAMPHORA.—*Nees.*

Flowers hermaphrodite, panicled, naked. Calyx 6-cleft, with a deciduous limb. Fertile stamens 9, in 3 rows; the inner with 2-stalked, compressed glands at base; anthers 4-celled, the outer introrse, the inner extrorse. Three sterile stamens, formed like the fertile, placed in a whorl, and alternating with those of the second row; 3 others stalked, with an ovate head. Fruit placed on the obconical base of the calyx.

This genus also formed part of Laurus until separated by Nees, and appears to possess sufficiently distinct characters to warrant the adoption of it. The species are large trees with triple-nerved leaves, having glands in the axils of the principal veins.

C. OFFICINARUM, *Nees.*—Leaves persistent, oval, acuminate, alternate at base. Flowers smooth outside.

Nees, *Laurin.* 88; Lindley, *Fl. Med.* 333; Linn., *Mat. Med.* 107; Stephenson and Churchill, 126; *L. camphorifera*, Kæmpfer, *Amœn.* 770; *Cinnamomum camphora*, Nees and Eberm., ii. 430.

Description.—A large tree, with a fragrant wood. The branches are somewhat drooping, smooth, and covered with a greenish bark. The leaves are alternate, on long petioles, ovate-lanceolate, somewhat coriaceous, smooth, shining, of a bright-green above, paler beneath, triple-nerved, with a depressed gland, opening by a pore, at the axils of the principal lateral veins beneath. Leaf-buds scaly. Flowers small, smooth externally, in naked, axillary, and terminal corymbose panicles.

This tree is a native of Japan, China, and Cochin China, and is cultivated in several places in the East Indies. Every part of it is aromatic, owing to the presence of Camphor, which is obtained, by dividing the wood,

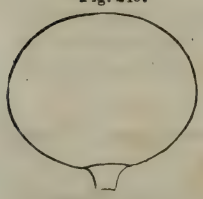
Fig. 239.

C. officinarum.

roots, &c., into small pieces, boiling them in water in an iron pot, which is covered by an earthen vessel, containing a straw cone. By the heat, the camphor is sublimed, and adheres to the straw. This is the plan, which, according to Kæmpfer, is used in Japan, but is not adopted in China, where from the accounts of several writers, it appears that the chipped wood is steeped in water, and afterwards boiled, until camphor begins to adhere to the stick used in stirring. The fluid is then strained, and on cooling, the camphor concretes. This is placed in alternate layers with finely pulverised dry earth, in a copper basin, on which another is inverted, and on the application of heat the camphor sublimes and adheres to the upper vessel.

Camphor in this state is impure, and of a dirty grayish colour, and forms what is called Crude Camphor. This is usually in small, grayish-coloured grains, which combine into crumbling masses. It is refined or separated from its impurities by being mixed with lime, and placed in a peculiar-shaped glass vessel, called a *Bombala*, and sublimed; when the pure Camphor has concreted at the upper part of the vessel, it is permitted to cool, when the glass is broken, and the cake of Camphor removed. The Crude Japan Camphor is much purer than the Chinese, and can be sublimed at a much lower temperature.

Fig. 240.



Bombala.

Refined Camphor is solid, colourless, and translucent, with a crystalline granular texture, a powerful and peculiar aromatic odour, and a bitterish, somewhat pungent taste, succeeded by a sensation of coolness. It is easily broken, but, at the same time, cannot be readily pulverised, except by the addition of a few drops of alcohol. It is lighter than water, and when placed on that fluid keeps up a constantly rotatory motion. It is volatilized at ordinary temperatures, and melts at 288°. It is very slightly soluble in water, but imparts its odour to it; alcohol, ether, and the oils readily dissolve it; and water charged with carbonic acid will take up a considerable portion of it. Camphor is considered to be an oxide of Camphogene (C^{10} H^{8}), or a solid volatile oil composed of (C^{10} H^{8} O).

Camphor is found in many plants, but only in two in any quantity; one

of these, *Dryobalanops camphora*, which affords the Borneo Camphor, has already been noticed, (p. 146,) the other the tree now under consideration. This article does not appear to have been known to the Greeks and Romans, but is spoken of by the earlier Arabian writers. Sprengel is of opinion that the first description of it was given by Simeon Seth in the 11th century.

Medical Uses.—The exact effects produced by Camphor on the system, have not been satisfactorily ascertained. It is known, however, that its local action on tender surfaces is that of an acrid, but it does not appear to produce any marked influence on the surface of the body, when the cutiele is uninjured. When it is administered internally, it is partially absorbed, as is the case with most of the volatile oils. Its main influence seems to be exercised on the nervous system, as in moderate doses it acts as a stimulant, and subsequently as an anodyne; whilst, in larger ones, it causes much disorder of the cerebro-spinal system; and, in over quantities, acts as a powerful acro-narcotic poison. It also operates as an anaphrodisiac; this property of it has long been known, and recent experiments have confirmed the assertions of earlier writers, in a great measure. Camphor has been prescribed in a multitude of diseases; its employment has been almost entirely empirical. It has been found useful in the low states of fever, where there is singultus, tremor, &c.; but its most decided effect is obtained as an anodyne in irritation or pain in the genito-urinary organs: thus it greatly alleviates the pain in dysmenorrhœa, especially when combined with a small quantity of opium; and has often been found of benefit in the strangury caused by blisters. It has also been found of service in pain in the bowels; and, in combination with laudanum, in restraining discharges from these viscera. Externally it is in very general use, in solution, as an embrocation in local pains.

It is given in substance, in tincture, and in mixture. The medium dose of the powder is from five to ten grains, given in pill or emulsion; of the tincture, ten drops to a drachm. It enters into the composition of Paregoric elixir, and although the most active ingredient in this excellent preparation is opium, its efficacy is undoubtedly aided by the camphor.

Cinnamomum.—*Nees.*

Flowers hermaphrodite or polygamous, in panicles or fascicles, naked. Calyx six-cleft, the limb deciduous. Fertile stamens 9, in 3 rows; the 3 inner with 2 sessile glands at base; anthers 4-celled, the 3 inner extrorse. Three capitate abortive stamens next the centre. Fruit seated in a cup-like calyx.

This is a somewhat extensive group of plants, removed from Laurus by Nees, having strongly-ribbed leaves, and the leaf-buds not scaly. It may be observed that many of the genera of the Lauraceæ are very closely allied, and might without confusion be considered rather as sections of Laurus than entitled to an equal rank; as they have, however, been considered as distinct by the best authorities, as Nees v. Esenbeck, Blume, Lindley, and others, I have adopted their views. The present genus is important, from affording Cinnamon and Cassia, but there are many doubts and differences of opinion as to the species furnishing these and some other analogous barks.

C. zeylanicum, *Nees.*—Branches somewhat quadrangular, smooth. Leaves ovate, or ovate-oblong, tapering into an obtuse point, triple-nerved, reticulated on the under side, smooth. Panicles terminal or axillary, stalked. Flowers hoary and silky; segments oblong, deciduous in the middle.

Nees, *Laurin.* 45; Nees and Eberm., *Handb.*, ii. 420; Lindley, *Fl. Med.* 329; *C. nitidum*, Nees, non Hooker; *Laurus cinnamomum*, Linn. *Sp. Pl.*

Fig. 241.

C. zeylanicum.
1. Perfect stamen, with an abortive one at base. 2. Pistil. 3. Fruit.

528; *L. cassia*, *Bot. Mag.* 1636.

This is the species furnishing the true Ceylon Cinnamon. It is a native of that island and of Java, and is also cultivated in many tropical countries. There are many varieties of it, one of which, *C. zeylanicum var. cassia*, (*Laurus cassia*, Linn.,) is considered by Nees to be the plant producing Cassia; but it is said by Mr. Marshall that it is only a coarse cinnamon, obtained from the roots or large branches of the true Cinnamon tree.

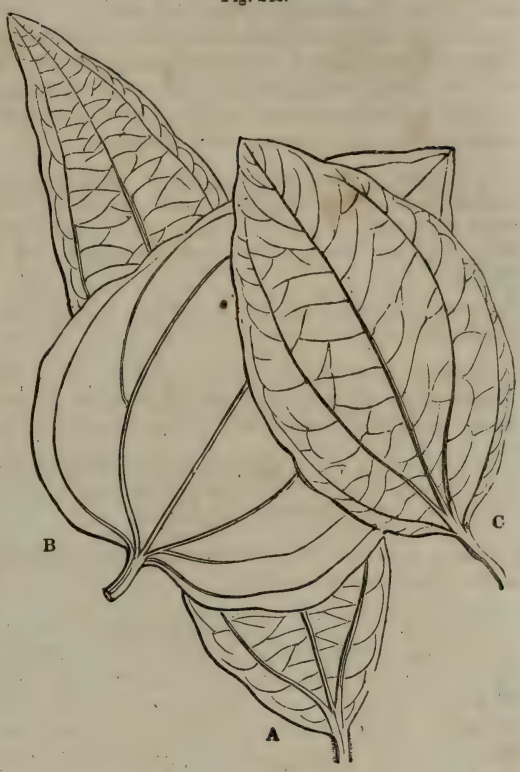
Cinnamon is cultivated in Ceylon in the southwest parts, where the soil is almost a pure sand, the climate damp, and the temperature high and equable. It is collected from trees above six years of age, but seldom before they are nine years old. The peeling of the branches begins in May, and lasts until September, and merely consists in slitting the bark longitudinally, cutting it across at certain intervals, and then turning it back. The epidermis is then removed by scraping, and the bark, as it dries, assumes the form of quills, the smaller of which are introduced into the larger ones. The drying is always performed in the shade at first, and finished in the sun.

Ceylon Cinnamon is in long and cylindrical pieces, thin, smooth, breaking readily with a splintery fracture. The colour is a dull yellowish-brown. It has an agreeable grateful odour, and a warm, sweetish, very pleasant aromatic taste. There are several qualities of it, differing in colour, odour, taste, and thickness. It consists of Volatile oil, Tannin, Mucilage, Cinnamic acid, Resin, &c. It appears to have been known at a very early period, being mentioned in Exodus (xxx. 23); it is also noticed by Herodotus, Hippocrates, and Dioscorides.

It is an aromatic stimulant, with a slight astringency, and is principally employed as a condiment and flavouring ingredient in culinary preparations. It is only employed in medicine as a carminative, or to check nausea; it however, enters into the composition of various preparations, to disguise the taste of some of their ingredients, or to aid their powers. The oil is of a dark colour and is very heavy; it has the same properties as the bark.

2. C. AROMATICUM, *Nees.*—A large tree. Branches angular, twigs and petioles covered with downy patches. Leaves oblong, rather acute at each end, triple-nerved, nerves disappearing at the extremity of the leaf, with curved veinlets on the under side. Panicles narrow and silky.

Fig. 242.



Leaves of Cinnamomum.
A. C. aromaticum. B, C. C. zeylanicum.

Nees, *Laurin.* 52; Lindley, *Fl. Med.* 330; *C. cassia*, Nees and Eberm., *Pl. Med.* 129; *Handb.* ii. 424; *Laurus cassia*, *Hort. Kev.* ii. 427; *L. cinnamomum*, *Bot. Repos.* 595.

A native of China; and according to Nees v. Esenbeck, the species furnishing the Cinnamon of China, in which opinion Dr. Royle seems to coincide. This is the origin of what is commercially known in this country as Cassia, but is in fact a mixture of a variety of different qualities of Cinnamon. It is difficult to ascertain exactly what is meant by the word Cassia, some writers including in it all varieties of inferior Cinnamon, whilst others restrict it to a coarse bark from Ceylon. There are several species which produce very analogous barks; thus Dr. Wight has shown that Linnæus included no less than three different plants, one the *C. sulphuretum*, Nees, another *C. inus*, Nees, and the third the *Litsæa zeylanica*. None of these afford the Chinese bark, but are the origin, as will be hereafter shown, of the Malabar and other Cassias.

Cassia is, like Cinnamon, mentioned by the earlier writers, as in the Bible (*Exodus*, xxx. 24), by Dioscorides, and other Greek writers. It bears a great resemblance to Cinnamon, but is in shorter pieces, and usually thicker, rougher, and denser, has a more powerful but not as agreeable a taste or pleasant odour; but in the bundles of Chinese Cinnamon, specimens may be found having all the characteristics of the Ceylon kind. Its medicinal properties are identical with that article.

3. C. NITIDUM, *Hooker.*—A small tree. Leaves elliptical or elliptic-oblong, tapering a little at each end, usually withering at the point, shortly triple-nerved, nearly veinless, smooth; the nerves nearly reaching the point. Racemes, or terminal compound cymes, branched, about as long as the leaves. Flowers silky; segments of the calyx deciduous in the middle.

Hooker, *Exot. Flor.* 176; Blume, *Rumphia*, 35, t. 15; Lindley, *Fl.*

Med. 332 ; *C. eucalyptoides*, Nees, Wallich, *Pl. Asiat.* ii. 73; *Laurus malabathrica*, Roxburgh, *Hort. Calc.* 30.

Inhabits India, Ceylon, Java, &c. This is one of the species which probably furnishes part of the Malabar Cassia, and is the principal source of the *Folia malabathri* of the older Pharmacologists ; these, however, appear to have consisted of the leaves of several species. They were formerly much used, but are now obsolete.

4. C. TAMALA, *Nees.*—Branches nearly round ; younger with a rough down. Leaves oblong-lanceolate, acuminate, acute at the base, smooth, triple-nerved. Midrib with lateral veins at the apex. Panicle somewhat terminal and axillary, divaricate. Calyx campanulate. Segments obovate, rather sharp-pointed, silky on either side, deciduous below the middle.

Nees, *Laurin.* 56 ; Nees and Ebermaier, *Handbuch*, ii. 426 ; Lindley, *Fl. Med.* 330.

Indigenous to many parts of India. The leaves are said by Nees and Esenbeck to form part of the Malabathri leaves, but Blume states that he never was able to detect any in the samples he examined.

5. C. LOUREIRII, *Nees.*—Branches compressed-quadrangular, smooth. Leaves somewhat oval, tapering to both ends, acuminate or pointed, minutely scaly beneath, triple-nerved. Midrib with lateral veins below the middle.

Nees, *Laurin*, 65 ; Lindley, *Fl. Med.* 330 ; *Laurus cinnamomum*, Loureiro, *Flor. Cochin.* i. 305.

A native of Cochin China and Japan. Lindley states that *Cassia buds* or *Flowers of Cassia* are the product of this species, but Royle is of opinion that they are derived from the same source as the Chinese Cinnamon. They are now seldom used. Loureiro says that the middle-sized shoots of this tree furnish a bark superior to the Ceylon Cinnamon ; and Poivre, in corroboration, observes, that a Cinnamon is collected in Cochin China of better quality than any other.

6. C. CULILAWAN, *Blume.*—Leaves ovate or lanceolate-oblong, finely acuminate, rather acute at base, smooth, obscurely reticulated beneath, with the lateral veins vanishing at the point. Racemes compound, or rather trichotomous cymes, terminal or axillary, few-flowered. Segments of calyx deciduous below the middle.

Blume, *Rumphia*, 26, t. 9, f. 1 ; Lindley, *Fl. Med.* 330 ; *Laurus culilawan*, Linn. *Sp. Pl.* 530 ; *L. culilawang*, Nees, *Disp. de Cinn.* 61.

This species is found in Amboyna and some other East Indian islands. It affords an aromatic bark, having the odour of cloves, but less pungent and more saccharine, with a bitter and mucilaginous taste. This bark was used in Europe about the close of the 17th century, and was considered to be a useful remedy in cases requiring a carminative and stomachic, as atonic gout, dyspepsia, &c. It was known as " Culilawan Bark," and was at one time much employed, but is now seldom to be met with.

Blume states that what is sold as Culilawan consists of a mixture of several different barks, but having the same properties ; he enumerates as their origin, *C. sintoc*, *javanicum*, and *xanthoneuron*. The bark of the first of these has been described under the name of " Sintoc," and Blume states that the second is well deserving of attention, on account of its powerful effects in spasmodic colic and the after-pains of lying-in women. Another bark has been described, of somewhat analogous characters, called " Massoy," and has been attributed to one or more trees of this genus ; but Blume states that it is not the product

of a Cinnamomum. It is derived from New Guinea, and from the account given of the plant from which it is derived, it appears that this has opposite leaves; the article spoken of by Raffles as furnished by a Java species, is probably the product of *C. xanthoneuron*, the bark of which, according to Blume, is so like the Massoy, as to be confounded with it.

Order 89.—THYMELACEÆ.—*Lindley.*

Calyx tubular, coloured; the limb 4- seldom 5-cleft; æstivation imbricate. Corolla none, or of scale-like petals at the opening of the calyx. Stamens inserted in the tube, generally eight, sometimes four, rarely two. Anthers two-celled, with a longitudinal dehiscence. Ovary single, with one pendulous ovule, and bearing a single style, with an undivided stigma. Fruit hard, dry, and nut-like, or drupaceous.

The plants of this order are in most cases shrubby, with a tough, fibrous bark, and exstipulate, entire, opposite or alternate leaves. They are principally natives of the cooler parts of India, South America, and also of the Cape of Good Hope and New Holland. Some are found in the northern parts of the world, one of which, *Dirca*, is a native of the United States.

The most striking peculiarity of these plants is the acridity and causticity of their bark, which, especially in a fresh state, acts as a vesicant, when applied to the skin, and creates much pain in the mouth and fauces when chewed. Most of the species of *Daphne* have been used in medicine, though only one, the *D. mezereum*, is officinal. The seeds of *Dais octandra* are said by Horsefield (*Cat. Pl. of Java*) to be used in Java as a purgative. The bark of *D. madagascariensis* affords a material for paper. The *Passerina tinctoria* of the south of Europe is employed to dye wool yellow. The bark of *Gnidia daphnoides* is so fibrous and tough as to be manufactured into ropes in Madagascar. The inner bark of *Lagetta lintearia*, a native of the West Indies, when macerated and stretched, assumes the appearance of coarse lace, and is so tough as to serve for ropes and whips. Dr. Wright (*Med. Plants Jour.*) states that it is very caustic, and may be used as a substitute for Mezereon. Several species of *Hernandia* are possessed of very active properties. *H. guianensis* has purgative fruits, which are used in Cayenne in emulsion to open the bowels. The *H. sonora*, found in both the Indies, is also purgative, and Rumphius states that the fibrous root applied either externally or taken internally, is a certain antidote against poison. The juice of the leaves is a powerful depilatory, removing the hair without occasioning pain. The succulent part of the fruit is also used, according to Descourtilz, in the preparation of a liqueur. (*Flor. Med. Antill.* ii. 309.) The fruit of *Inocarpus edulis* is said to resemble the chestnut in taste, and is much eaten in the South Sea islands, Java, &c.; it is extremely abundant in New Guinea. (*Lesson.*)

Daphne.—*Linn.*

Calyx tubular, marcescent. Tube cylindrical, coriaceous. Limb 4-lobed. Stamens short, in two rows, inserted about the middle of the calyx-tube. Anthers roundish, oblong, 2-celled, included. Ovary ovate. Style short, terminal. Stigma capitate, entire. Berry oval, 1-celled, 1-seeded.

A genus of shrubby plants, principally indigenous to Europe and Middle Asia, having a caustic, acrid bark, in some cases possessing tinctorial powers.

Many of the species have been used in medicine, but one only is officinal in the U. S. Pharmacopœia.

D. MEZEREUM, *Linn.*—Flowers ternary, sessile on the stem. Leaves lanceolate, deciduous.

Linn., *Sp. Pl.* 509; Woodville, iv. t. 245; Stokes, ii. 372; Stephenson and Churchill, ii. 65; *Flor. Med.* v. 236; Lindley, *Fl. Med.* 324.

Common Names.—Mezereon; Spurge Olive.

Foreign Names.—Bois gentil, *Fr.*; Biondella, *It.*; Kellerkals, *Ger.*

Fig. 243.

D. mezereum.

1. Stamens. 2. Pistil. 3. Part of berry and seed.

Description.—Root large. Stem bushy, with many upright, alternate branches, leafy when young, and covered with a smooth gray bark. The leaves are deciduous, lanceolate, scattered, petiolated, smooth, appearing after the flowers, and accompanied with the flower-buds of the next season. The flowers are in clusters, sessile on the naked branches, with several smooth, ovate bracts; they are of a pale rose-colour, very fragrant, and consist of a petaloid calyx, which is tubular, with the limb divided into four deep, ovate, spreading segments. The stamens are eight in number, alternately longer, inserted into the tube, and furnished with roundish, oblong anthers. The ovary is ovate, superior, bearing a short style with a flattish, entire stigma. The fruit is a pulpy, scarlet berry, containing a single seed.

The Mezereon is a native in many parts of Europe, flowering very early in the season, before the appearance of the leaves. There are several varieties, with different coloured flowers and fruit. It is by no means certain that this plant was known to the ancients, though some of the other species were certainly familiar to them. The first definite account of this one is given by Tragus (*Hist. Stirp.* 1532), under the name of *Thymelea*, by which appellation it is also noticed by many succeeding writers. The Mezereon of the Arabian writers is stated to be the *Cneorum tricoccon* by most writers, on the authority of Bauhin; but both Cordus and Schröder are of opinion that it is the *D. cnidium*.

The genus *Daphne* has been much divided by modern botanists, and the present plant now forms the type of MEZEREUM; but as these changes are not recognised in the officinal lists, I have preferred to consider it under the present head, rather than to adopt the more correct nomenclature.

The part directed to be used, is the bark of the root; this is tough, pliable, and fibrous, externally corrugated, and of a brown colour, and internally cottony and white. Most of that found in the shops comes from Germany, and is derived from the stem and branches; it is in long strips, folded in bundles, of a grayish or reddish-brown colour externally, under which, on the removal

of the epidermis, it is greenish; internally it is white and fibrous. The taste is at first somewhat sweetish, but soon becomes very acrid and unpleasant; in a fresh state, the smell is nauseous; but when dried, it is inodorous. It yields its properties to water and alcohol. Several analyses have been made of this and other species, and they are shown to owe their active qualities to the presence of an acrid resin and a peculiar crystalline principle, discovered by Vauquelin, to which he gave the name of *Daphnin*. It is colourless and transparent, crystallizes in aggregated prisms, very soluble in water, alcohol, or ether, is inodorous, and of an acrid taste. Gmelin and Bär consider that it is analogous to asparagin, and that when pure, it has very slight powers. The active principle is evidently, as is stated by Vauquelin, an essential oil, which is either changed into a resin, or is in combination with it. This oil is partially volatile, for Mr. Squire (*Pharm. Trans. Lond.*) says, that the pungent odour given off by boiling the root, is so powerful as to produce great irritation.

Medical Properties.—When applied to the skin, the Mezereon, especially in a fresh state, acts as a topical irritant and vesicant. When taken internally in large doses, it operates as a violent irritant poison, but in moderate doses promotes the action of the secernent organs, especially the kidneys and skin. From its irritating powers, it sometimes increases the peristaltic power of the intestines, and it is stated by Vogt that it occasionally affects the cerebro-spinal system.

It is seldom administered alone, being generally given in combination with sarsaparilla and other articles, as an alterative and diaphoretic, in chronic cutaneous, venereal, rheumatic, and scrofulous affections. Dr. Russell (*Med. Obs. and Inquir.* iii. 194) recommended a decoction of this bark in venereal nodes and pains in the bones; and this opinion of its powers as a deobstruent in inveterate syphilitic cases being supported by Drs. Monro, Fothergill, and Home, it was considered as capable of curing that disease, even where mercury had failed, until the experiments and observations of Mr. Pearson (*Obs. on various articles of the Mat. Med.* 1800) demonstrated that it had not the power of removing the venereal affection in any one stage or form. In consequence of these remarks, its reputation rapidly declined, and it is now seldom employed in these cases, except as a component of the compound decoction of sarsaparilla. Cullen prescribed it with some success in chronic cutaneous diseases, and further experience has shown that it may be beneficially used in these, as well as in some forms of scrofula and chronic rheumatism.

Topically, it has been applied with some success as a sialagogue in toothache and in paralysis of the throat. It is also much employed in France and Germany as a vesicatory.

Several other species of *Daphne* are used as substitutes for the Mezereon, or even preferred to it; of these the *D. gnidium* and *D. laureola* are the most generally resorted to, as possessing identical properties, but from the experiments of Mr. Squire, it would appear that the *mezereum* is the most active, both in the degree and duration of its stimulating effects. It may be noticed that where it is necessary to powder these barks, the operator should use some caution, as an inhalation of the dust creates much irritation of the air passages. The general mode of administration is in decoction, but as the active principle is volatile, a maceration with heat in close vessels would be a more effectual mode of preparation.

Dirca.—*Linn.*

Calyx simple, coloured, corolliform, limb obsoletely 8-toothed. Corolla none. Stamens 8, unequal, exserted. Style filiform, lateral. Berry one-seeded.

A genus of a single species peculiar to North America, closely allied to Daphne in its physical properties.

D. PALUSTRIS, *Linn.*—Leaves alternate, subsessile, oval, entire.

Linn., *Amœn.* iii. 12; Torrey, *Man.* 170; Bigelow, *Am. Med. Bot.* ii. 37; Rafinesque, *Med. Flor.* i. 158.

Common Names.—Leather-wood; Moose-wood; Rope-bark.

Fig. 244.

D. palustris.

Description. — A shrub from three to seven feet high, with spreading, crooked, articulated branches. The leaves are alternate or scattered, nearly sessile, ovate, entire, downy when young, and smooth and membranous when full grown, paler beneath, not appearing until after the flowers. The flowers are in threes, on cohering peduncles; they are yellow, and consist of a tubular eight-toothed calyx, which is drooping, and contracted at the middle and base. The corolla is entirely wanting. The stamens are eight, longer than the corolliform calyx, and alternately longer; with rounded anthers. The ovary is ovate, and supports a long filiform, curved style, which is inserted laterally, and is terminated by an acute stigma. The fruit is a small, oval berry, of an orange colour, containing a single seed.

The Leather-wood is found in most parts of the United States, but is more abundant in the Atlantic than in the Western States; it occurs in shady swamps or on the banks of streams. It flowers very early in the season, when the shrub is wholly destitute of leaves. The bark is very fibrous, and has been used for cordage, and might be advantageously employed in the arts, as by proper preparation it affords a strong fibre from which an excellent paper can be made. No complete analysis has been made of it, but it appears to contain an Acrid resin, a Bitter extractive, Mucilage, &c.

Medical Uses.—The berries are emetic and poisonous. The fresh bark applied to the skin causes redness and vesication, but the sores caused by it, as is the case generally with those produced by the vegetable epispastics, do not heal readily, and sometimes degenerate into obstinate and ill-conditioned ulcers. When chewed it causes much heat and pain in the mouth, followed by salivation, and hence has been found useful in toothache and other complaints where the acrid masticatories have been found serviceable. When administered internally in small doses it induces a sense of heat in the sto-

mach, followed by vomiting and sometimes catharsis. When given in decoction, it acts as a sudorific and expectorant, and is considered by Bigelow to be a substitute for Senega. It has also been given in the same class of cases in which Mezereon has been found useful, and it is said with equal benefit. It is, however, a remedy that may be discarded, except in the absence of more efficient and better known articles.

Order 90.—ULMACEÆ.—*Mirbel.*

Flowers perfect or polygamous. Calyx membranous, campanulate, inferior, 4—5-cleft, the lobes imbricated in æstivation. Stamens definite, as many as the lobes of the calyx and opposite to them, inserted on the base of the calyx. Ovary 1—2-celled, with a single suspended ovule in each cell; styles or stigmas 2. Fruit 1-celled and 1-seeded, either drupaceous or a samara. Seed solitary, pendulous; exalbuminous.

Trees or shrubs, with rough, alternate, generally deciduous leaves, each having a pair of deciduous bracts at base. This order will probably be divided, as the *Ulmeæ* or true Elms differ in many respects from the *Celteæ* or Hack-berries; the first having a membranous samara-like fruit, with anatropal ovules, and the latter a hard fleshy berry, and amphitropal ovules.

Many species of *Ulmus* have been employed in medicine, the inner bark of most of them being demulcent and mucilaginous. That of *U. campestris*, of Europe, is a mild astringent tonic, and is also said to be diuretic; if so, it is a very weak one. It was formerly much praised as an alterative in cutaneous and venereal affections, as a substitute for Sarsaparilla. The bark of *U. effusa* has analogous properties. The most important of these barks, and the only one recognised in the U. S. Pharmacopœia, is that of the *U. fulva* (*U. rubra*), or Slippery Elm; this tree is indigenous in most parts of the United States, but is most abundant to the west of the mountains. The inner bark, as prepared for use, is in long pieces of a fibrous texture, tawny on the outer surface, and reddish on the inner; it has a peculiar but not unpleasant odour, and a very mucilaginous taste. When finely ground it affords a light, grayish-yellow powder. From its abundant mucilage it is an excellent demulcent in all cases requiring this class of remedies, and also forms a good article of diet where it is wished to give nourishment of the blandest kind, being a very good substitute for Gum Arabic. It has also been employed in cutaneous diseases, and from witnessing its effects in some extremely obstinate cases of herpetic and syphilitic symptoms, I am inclined to attribute higher curative powers to it, than are usually admitted. Dr. McDowell has spoken in praise of the good effects obtained from bougies, tents, &c., formed of this bark. Externally, the bark has been found very serviceable as an application to inflamed parts; it is used in several ways, either in decoction, as a fomentation, in a poultice made with the powder, or the bark itself softened by steeping in hot water.

It is usually administered internally in infusion, which may be made more or less mucilaginous, according to circumstances.

The berries of some species of *Celtis* (Hack-berry, Sugar-berry), are sweetish and sub-astringent, and are said to be useful in dysentery. The *C. orientalis* yields a gum, resembling that of the Cherry; its roots, bark and leaves, are somewhat aromatic, and have been used in the East Indies as a remedy in epilepsy. A decoction of the branches of *C. australis* is also considered beneficial in gonorrhœa and dysentery.

Group XXXVII.—Piperales.

Order 91.—PIPERACEÆ.—*Richard.*

Flowers mostly sessile, sometimes pedicellate, in terminal or axillary spikes or opposite the leaves, naked, with a bract outside. Stamens 2 or more, on one side of, or around the ovary. Anthers 1—2-celled. Pollen roundish, smooth. Ovary free, simple, 1-celled, with a solitary, erect, orthotropal ovule. Stigma sessile, simple, rather oblique. Fruit free, somewhat fleshy, indehiscent, 1-celled, 1-seeded. Seed erect, with the embryo in a fleshy sac at the apex, on the outside of the albumen.

An order peculiar to the hot regions of the world, consisting of trees and shrubs, with articulated stems; opposite, verticillate, or, by abortion, alternate leaves; stipules none, or in pairs, or single and opposite the leaf. Some difference of opinion exists as to their station; Richard, Blume, and others consider them as monocotyledonous; but they have the medulla rays of the exogens. This, and the reticulation of their leaves, &c., has led most botanists to include them among the dicotyledonous plants.

Their general character is an aromatic pungency, with, in some cases, astringent and somewhat narcotic properties. The species are very numerous, but were all arranged in one genus, that of *Piper*, by Linnæus; and few changes were made until the examination of the subject by Miquel. In his "Systema Piperacearum," he proposes to divide the order into two tribes. The first, of *Piperomidæ*, includes the herbaceous species with axillary catkins, androgynous flowers, and anthers one-celled in dehiscence; none of these are employed medicinally, and but few are made use of in any way. The second tribe, *Piperidæ*, contains the shrubby and arborescent species, having catkins opposite to the leaves, flowers usually dicœcious; the fertile ones with several distinct stigmas, the sterile with two-celled anthers. Each of these tribes contains numerous genera, which appear to be instituted on sound differential characters.

Piper.—*Linn.*

Spike wholly covered with flowers. Flowers perfect, rarely dicœcious, each supported by a bracteole. Stamens 2 or more. Ovary with a single, erect ovule. Stigma punctiform, obtuse or cleft. Berry 1-seeded. Embryo inverted.

This genus is exclusively East Indian, but some of the species are extensively cultivated in the West Indies. It is now very much restricted, by the removal of many of the plants, formerly included in it, to other genera.

P. nigrum, *Linn.*—Stem trailing or climbing, shrubby, dichotomously branched, with tumid joints, often throwing out cauline radicles. Leaves alternate, distichous, broad-ovate, acuminate, of a dark-green colour, and shining above, paler beneath, 5—7-nerved, reticulated. Petioles rounded. Spikes opposite the leaves, mostly towards the extremities of the branches, pedunculate, long, slender, drooping. Fruit ripening irregularly throughout the year, round, sessile, at first green, then red, and finally black.

Linn., *Sp. Pl.* 40; *Bot. Mag.* 3139; Blume, *Enum. Pl. Jav.* 64; Lindley, *Fl. Med.* 310; *P. aromaticum*, Poiret, *Ency. Meth. Suppl.* v. 458; Fée, *Cours.* ii. 618.

Common Names.—Pepper; Black Pepper.

Foreign Names.—Poivre, Poivre noir, *Fr.;* Pepe nero, *It.;* Schwarzer Pfeffer, *Ger.*

Fig. 245.

P. nigrum.

The Pepper vine is a native of various parts of the East Indies, and is extensively cultivated in Sumatra, Java, Malabar, &c. It is propagated from cuttings, and begins to bear fruit in three or four years from the time of planting. The berries are gathered before they are quite ripe, and dried in the sun. They become wrinkled and black in consequence of the drying of the pulp over the grayish-white seed. In this state they are known as *Black Pepper;* if permitted to ripen, and soaked in water so as to permit the outer coat to be removed, they form *White Pepper*. The principal import of Pepper is from Sumatra and Java.

Pepper has an aromatic, peculiar odour, and a hot, spicy, pungent taste, most powerful in the black variety. These properties are taken up by alcohol and ether, and partially by water. It contains an acrid Resin, Volatile oil, a peculiar neutral principle called Piperin, Gum, &c. Piperin was discovered by Oersted in 1819. It is crystalline, of a white colour when perfectly pure, but is usually of a yellowish tint; is tasteless and inodorous, insoluble in cold water, but slightly soluble in boiling water, wholly soluble in alcohol. It is also taken up by acetic acid.

Medical Uses.—Pepper is principally employed as a condiment; but has also been used in medicine, especially in the treatment of intermittent fevers. It is a warm carminative stimulant, causing, when given in over quantity, great arterial excitement, and is considered, in tropical climates, to be more heating than the hot, pungent Capsicum. It is chiefly used to correct the flatulent or griping qualities of certain articles of diet. It has, however, been

employed in gonorrhœa as a substitute for cubebs, and as a masticatory in relaxed uvula, &c. As an external application, in the form of an ointment, it has proved serviceable in tinea capitis.

Piperine has been highly recommended by several Italian physicians as a febrifuge, and as being milder in its action, and yet more certain and speedy than bark or its alkaloids; but extended trials with it have shown that it is far inferior to these articles, and that all the virtues it possesses are owing to an admixture with the acrid resin and oil, as when pure it has no influence on the system. The dose of pepper is from five to twenty grains; of piperin one to ten grains.

Another species, the *P. trioicum* of India, bears an extremely pungent fruit, said to be superior to the best Black Pepper. Roxburgh says that the leaves of this plant are glaucous; but Dr. Heyne, who succeeded him in the superintendence of the Pepper plantations, seems to think that it is only a variety of *P. nigrum*, produced by defects in the cultivation.

Chavica.—*Miquel.*

Flowers diœcious. Bracts of the male, like those of the female catkins, shortly-stalked, almost quadrangular, peltate. Sterile flowers: stamens 2, anthers 2-celled. Fertile: style very short or wanting; in the latter case the 3—6 thick stigmas are sessile. Fruit uniting with the permanent bracts into a fleshy, fusiform fruit. Seeds almost lenticular, with a scaly, finely-pitted testa, and a mealy albumen, often horny at the outer part.

This Asiatic genus was separated from *Piper* by Miquel. The species are much cultivated in many parts of the East Indies, both for their fruit and for the pungent, aromatic leaves of some of the species. The Long Pepper and Cubebs have usually been attributed to two of them; but it now appears certain that each of these articles are furnished by several closely-allied plants.

The following are stated by Miquel to afford Long Pepper.

1. Chavica peepuloides, *Miquel.*—Young branches, petioles, and peduncles covered with long hairs. Leaves smooth, membranous, with transparent dots; the lower ovate, 7-nerved, rounded at base, attenuate at apex; the upper unequal, lanceolate, 5-nerved, attenuate at apex. Male spikes with short peduncles, slender, with circular bracts; the female cylindrical, on short peduncles.

Miquel, *Syst. Piper; Piper pepuloides*, Roxburgh.

2. C. roxburghii, *Miquel.*—A trailing shrub with dichotomous branches, but erect during the flowering season; stems at first finely hairy, afterwards smooth. Leaves thick, membranous, at first with fine hair on the veins, afterwards smooth, covered with fine dots. Lower leaves on long petioles, roundish, broadly cordate at base; upper ones sessile, more or less elongated, unequally cordate at base, embracing the stem. Male catkins filiform, cylindrical, peduncles as long as leaves; female scarcely half as long, but thicker than the male, peduncles as long as the catkins.

P. longum, Linn., *Sp. Pl.* 41 (in part); Roxburgh, *Fl. Ind.* i. 154; Nees, *Pl. Med.* t. 23; Lindley, *Fl. Med.* 311.

These two species are found in a wild state in India, and are cultivated in Bengal. They yield the Long Pepper of India, which consists of the fruit catkins, dried in the sun. The root and thicker parts of the stems are cut into small pieces, and much used in India for medical purposes.

3. C. officinarum, *Miquel.*—A climbing shrub, with coriaceous leaves, covered with fine transparent dots, smooth and paler beneath. Lower leaves on long petioles; 3—5-nerved, and ovate-cordate; upper ones on shorter footstalks, more elongated, base unequal rounded or attenuated, apex attenuated. Peduncles of catkins longer than petioles. Female catkins short and cylindrical, slenderer towards the apex.

Piper longum, Linn., *Sp. Pl.* 41 (in part); Rumphius, *Amboina*, v. t. 116, f. 1.

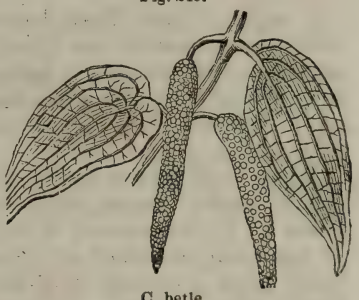
This species is a native of the Philippine and Sunda Islands, and is much cultivated in Java. It yields the Long Pepper of Sumatra and Java. The dried catkins are very aromatic, have a pungent aromatic taste, stronger than that of Black Pepper. They are of a grayish-brown or grayish-cinnamon colour, their stalk is roundish, compressed, somewhat woody, curved and almost smooth. They are thick, cylindrical, somewhat narrowed towards the apex, thick at base, and facetted with a sort of network, of the projecting apices of the berries.

Besides these, some other species afford analogous products: *P. chaba*, Hunter (*Asiat. Resear.*, ix. 391); this may possibly be identical with the last, as it grows in the islands, and Lindley speaks of it as furnishing the Island Long Pepper; *P. sylvaticum*, Roxburgh (*Fl. Ind.* i. 156), or Mountain Long Pepper, grows on the northern frontiers of Bengal, and is used both in a green and ripe state.

Long Pepper is very little employed in this country, either as a condiment or in medicine. It contains Piperine and a pungent concrete oil, similar to those in the Black Pepper.

Two other species of this genus are much cultivated in the East Indies, for their pungent, aromatic leaves, which with lime and areca nut, are the materials for betel chewing, so universal in many oriental countries. These are *C. betle* and *C. siribosa*. Betel produces somewhat intoxicating effects, stimulates the salivary glands to a great degree, acts powerfully on the stomach, and diminishes the perspiratory function (see Hooker, *Bot. Mag.* 3132). The juice of the leaves is prescribed by Hindoo practitioners as a febrifuge, and is also given in the indigestion of children, and in conjunction with musk in hysteria (*Ainslie*, ii. 466). In tropical America the fruits of *C. amalago* are used as a condiment, and Lunan (*Hort. Jam.* i. 51), says that the leaves and young shoots are discutient, and an infusion of the root, resolutive, sudorific and diaphoretic. The bark of *C. majuscula*, of Java, is held in esteem in Java as a rubefacient in rheumatism.

Fig. 246.



C. betle.

Cubeba.—*Miquel.*

Flowers dicœcious. Male catkins smaller, with sessile bracts, overlaying each other, behind which are 2—5 stamens, with ovate or reniform 2-celled anthers. Female catkins with almost sessile bracts, roundly peltate, often hairy beneath and persistent. Ovary sessile, ovate; stigmas 3—5, sessile, short, recurved. Berries pseudo-pedicellate. Seeds roundish, with coriaceous or horny testa and mealy albumen.

These are climbing shrubs, peculiar to the East Indies, and hotter parts of Africa. The female plant is often distinguishable from the male by habit, and the form of the leaf, but always by the catkins being thicker, and presenting at maturity an almost clustered appearance. All the species furnish what is called Cubeb Pepper, and were formerly included in *Piper cubeba* of Linnæus.

1. C. OFFICINALIS, *Miquel.*—A climbing shrub with smooth leaves; the lower, cordate at base, ovate, with a short point; the upper, ovate, more elongated, with a rounded base and smaller. In the male plant 5, female 5—9-nerved. Catkins on peduncles as long as the petioles; in the male slenderer than in the female; bracts coarsely hairy; berries globular, pedicels longer than themselves.

P. cubeba, Linn., *Suppl.* 90; Nees and Eberm, *Handbuch*, i. 102; Lindley, *Fl. Med.* 313; Blume, *Act. Bat.* xi. 200, f. 21; *C. officinalis*, Micquel, *Syst. Piper.*

This, according to Lindley, is the *P. cubeba* of the Linnæan Herbarium, and Miquel states that it is a native of the west part of Java and the adjacent small islands, also cultivated in the lower parts of Java, whence large quantities are annually exported. Blume (*l. c.*), states that although of good quality, none are sent to Europe, those exported being from the following species.

2. C. CANINA, *Miquel.*—Stem flexible, rooting, climbing. Leaves ovate, or ovate-oblong, sometimes obliquely cordate at base, lower with about 5 nerves; upper 7-nerved and regularly cordate, all downy beneath, especially when young. Peduncles about as long as the petioles. Fruit red, oval, stalked.

Blume, *Act. Bat.* xi. 214, f. 26; Miquel, *Syst. Piper.*; *P. caninum*; Rumphius, *Amboin.*, v. t. 28, f. 2; Nees, *Plant. Med.* t. 22, f. 1; Roxburgh, *Fl. Ind.* i. 161; Lindley, *Fl. Med.* 314.

A native of Java, Sunda Islands, the Moluccas, &c. Blume says that the Cubebs of commerce are chiefly furnished by this species, which has a smaller and shorter-stalked berry than that of *C. officinalis*, having a distinct anise flavour and is less pungent, but Dr. Lindley observes that he cannot perceive any difference in the taste of the dried fruit of the former, and the cubebs of the shops.

Miquel is of opinion that the figures 2, 4, 5, of the 22d plate, in Nees, represent another species, which he calls *C. costulata*. Cubebs are also furnished by *C. borboniensis*, of the Isle of Bourbon, and which Fée referred to *P. caudatum*, but which is a Brazil species. The Cubebs from the Cape of Good Hope, according to Miquel, are from *C. capensis*, and those from Guinea from *C. clusii*; this latter is probably *Piper afzelii*, which is stated by Smith in Rees' Cyclopædia, and by Nees and others, to furnish Guinea Cubebs, and which Lindley says is very different from the above, and the quality of whose fruit is still to be ascertained. Miquel, in addition, believes that the Cubebs of commerce are also in part from *C. sumatrana*, *C. nessii*, and *C. wallichii*.

The Cubebs of the shops somewhat resemble Black Pepper, but are lighter coloured, and are all furnished with a short stalk. The sarcocarp is thinner, the shell hard, and the seed spherical, white and oleaginous. The taste is acrid, peppery and camphoraceous; the odour is peculiar, aromatic, and rather agreeable. They contain Volatile Oil, Resin, Extractive, and a peculiar neutral principle called Cubebin. Their properties depend principally on the oil, which is transparent, light-coloured, and with the smell and taste of the berries.

Cubebs do not appear to have been known to the Greeks, and Royle is of opinion that the Arabs became acquainted with them through the Hindoos. Pereira shows that they were used in England in 1305, where probably they became known on the return of the Crusaders from Syria.

Medical Uses.—Cubebs are stimulant, and are employed as carminatives and stomachics in their native countries. From their exercising a special action on the genito-urinary organs, they have been used as diuretics, and some-

times have proved of service, but their principal employment is in gonorrhœa. Some difference of opinion exists as to the stage of the complaint in which they should be administered; judging from their stimulating nature, their administration should be withheld, until the active inflammatory symptoms have subsided; and this is the course advised by many eminent practitioners. Others, again, state that they are of most service in the most inflammatory forms of the disease. It has been said that they are apt to cause swelled testicles, but this does not seem to be the case in a greater proportion of cases than with any other remedy. It is generally admitted that if they do not mitigate the discharge in a few days, any longer use of them is improper. To do good, they must be given in as large doses as the stomach will bear with impunity. They have also been employed in leucorrhœa, and in catarrhal affections of the respiratory mucous membranes, especially when the secretion is copious, and the system relaxed.

The dose of the powder is from ten grains to three drachms, according to the nature of the complaint. The oil is an excellent method of administration; the dose of it is from ten to twelve drops, gradually increasing, as long as the stomach will bear it. Combined with Copaiva, it is sometimes very effectual.

Besides these species, a variety of others of this order have attained much reputation.

Pothomorpha peltata, the Caapeba of Brazil, is considered as a most effectual diuretic, and has been highly recommended in strangury. (*Flor. Med. Antill.*, iv. 14.) *P. umbellata*, which is also known in Brazil under the name of Caapeba, is there much esteemed in obstructions of the abdominal organs, and is thought to increase the action of the lymphatic system, and to promote all the secretions. A decoction of the leaves is also used in glandular swellings. (Martius, *Travels*, ii. 93.)

The fruits of *Peltobryon longifolium*, are substituted for Long Pepper, in some parts of South America; and the root of *P. parthenium* is administered in Brazil as a remedy in mucous discharges of the genito-urinary organs and in menorrhagia; whilst those of *Serronia jaborandi*, *Enckea unguiculata*, and *E. glaucescens*, are esteemed to be sialagogue and diuretic. *Peperomia inæquifolium* is used as a condiment in Peru, and the *P. pellucida* is so little acrid that its leaves are eaten as a salad.

Micropiper methysticum, the Ava root of the South Sea Islands, has narcotic properties. When the fresh root is bruised and suffered to macerate with water, it forms an intoxicating drink, which is in universal use among the inhabitants of the Pacific Archipelago. The general mode of preparation is to chew the root, and when a sufficient quantity is collected, to pour water upon it; when it is properly macerated, it is strained off, with certain ceremonies, and drank in large quantities. (See *Narr. U. S. Explor. Expedit.* iii. 115, 157.) This beverage is considered by them as a cure for syphilis, for which purpose they take sufficient to inebriate themselves; this lasts for some time, and is succeeded by a most profuse perspiration, which they maintain as long as possible. The tincture of this root has been found beneficial in gout and chronic rheumatism. M. Lesson remarks that it is curious that the species of the Piperaceæ should be employed as a remedy in venereal affections in so many countries, and among nations having no communication with each other. Thus in India, the *Cubeba*, in Tahiti the *Micropiper*, in Amboyna, the *Chavica siriboa*, in Mexico the *C. amalago*, and in Brazil one

or more species of *Pothomorpha*, are deemed efficacious in the removal of the various forms of venereal diseases.

Another plant of this order has lately attracted much attention for its remedial powers, this is *Artanthe elongata*, Miquel (*Piper angustifolium*), a native of Peru, where it has long enjoyed much reputation as a hæmastatic, being called "Yerba del Soldada," or Soldier's Weed, from its reputed efficacy in arresting the flow of blood from wounds. It was first brought before the profession by Dr. Ruschenberger of the U. S. Navy, who obtained a knowledge of it during 1834, whilst on duty on the Pacific coast of South America, and it has more recently been noticed by several practitioners in England and this country. It is generally supposed to be the plant mentioned above, figured by Ruiz and Pavon, and of whose representation the accompanying cut is a copy. The first specimens brought by Dr. Ruschenberger were so much broken that it was difficult to ascertain more than the fact of their being fragments of a species of the Pepper tribe. The article at present in our market, being in a more perfect state, permits no doubt of its belonging to this order, at the same time the leaves are much less elongated and proportionally broader than those of the specimen figured by the authors of the Flora Peruviana, and the spikes or catkins are more cylindrical throughout their length. Dr. Scrivener in a letter to Dr. Ruschenberger states, there are three kinds of Matico, distinguished by the colour of their stems; as red, white and brown, the former of which is esteemed the most efficacious. Dr. Lindley (*Veg. King.* 518, 707) says, "In Peru the plant is called Moho Moho, and is extensively used for the same purposes as Cubebs, which this Pepper much resembles in smell." And in another place, "The famous vulnerary called Matico, and said to be derived from *Artanthe elongata*, is really, according to Mr. Hartweg, the *Eupatorium glutinosum*;" to this he subjoins the following in a note, as derived from that gentleman. "Matico is the vernacular name applied by the inhabitants of Quito to Eupatorium glutinosum, or the Chussalonga, in the Quichua language. It forms a shrub 3—5 feet high, and is common in the higher parts of the Quitinian Andes, where its properties have been discovered some years back by a soldier named Mateo,

Fig. 247.

A. elongata.

better known under his nickname of Matico (little Matthew), who, when wounded in action, applied accidentally the leaves of some shrub to his wound, which had the immediate effect of stopping the bleeding. This shrub happened to be the Chussalonga, which has since been called in honour of its discoverer, Matico. That it is the true Matico of the inhabitants of Quito and Riobamba, I have not the slightest doubt." "I have also a small quantity of powdered leaves of some shrub possessing the same virtues as the Matico, collected in Bolivia, where it is known under the name of Moxo-Moxo. From bits of square stems which I find in the parcel, I suspect this to belong to some labiate."

From this, it appears that more than one plant is known in South America under the name of Matico, and that they are all considered as hæmastatic. But it is equally certain that the specimens obtained by Dr. Ruschenberger, those now in our shops, and those experimented upon by Dr. Jeffreys and others in England, belong to one of the Peppers, and probably to the Artanthe; though, as before stated, some differences are observable between them and the figure in Flora Peruviana.

Matico has been chemically examined by Mr. Mason, and found to contain Resin, and Volatile oil, but no Tannin. As a mode of arresting external hæmorrhage, experiments show that some reliance can be placed upon it, though as is observed by Dr. Carson (*Pereira*, ii. 222), the mechanical properties are instrumental in arresting the flow. This is proved by the fact that its under surface, which is covered with hairs, and so much reticulated as to appear spongy, acts more efficaciously than the upper. But it has likewise been found of benefit in various internal complaints, where there is too copious a discharge, as menorrhagia, leucorrhœa, catarrhus senilis, &c. It is given in infusion, tincture, syrup, &c. See Carson, Pereira, *Mat. Med.*; Dunglison, *New Remedies*, 433; Ballard and Garrod, *Mat. Med.* 385.

Group XXXVIII.—Urticales.

Order 92.—URTICACEÆ.—*Endlicher.*

Flowers small, monœcious or polygamous, scattered or collected, in heads or catkins. Calyx membranaceous, lobed, persistent. Male: stamens definite, distinct, inserted on the base of the calyx, opposite to its lobes; anthers often curved inwards in æstivation, and turned backwards, elastically, when mature. Female: ovary superior, simple; ovule solitary, erect; stigma simple, fringed. Fruit a simple indehiscent nut, surrounded by the calyx. Embryo straight; radicle superior.

An order of trees, shrubs, or herbs, with alternate leaves, having asperities, or stinging hairs, and membranous stipules. They are found in all parts of the world. Their great characteristic is the extreme causticity of the fluid secreted by the glands at the base of the hairs with which many of them are covered. This is a well-known property of the common Nettle, but is far more remarkable in some of the tropical species, as the *Urtica crenulata* of the East Indies, which acts with almost as much virulence as the bite of a venomous reptile; *U. stimulans*, of Java, is almost as poisonous, but they are both exceeded by *U. urentissa* of Timor, the effects of which are said to last for a whole year, and even in some cases to cause death.

The medical qualities of these plants are not remarkable, though several of them have been employed. *Urtica dioica* is esteemed diuretic and astrin-

gent, and a decoction of it, with salt, will coagulate milk as readily as rennet. The leaves and seeds of *U. membranacea* are considered, in Egypt, to be emmenagogue and aphrodisiac. A native species, *U. pumila*, which is quite smooth, is said to be an excellent application to inflamed parts, and to relieve the eruption caused by the *Rhus;* its properties have not been fully investigated, and it deserves attention. Martius states (*Travels*, ii. 94), that several species of *Bœhmeria*, and more especially *B. caudata*, are employed in Brazil, with much success, in hæmorrhoidal tumours; a decoction of the leaves is used as a bath or fomentation. In the same country an extract of *Pilea muscosa* is regarded as an efficacious remedy in dysuria.

Several species of *Parietaria* have attracted notice: the *P. officinalis*, of Europe, is mentioned by Dioscorides, as beneficial in gout, and has been highly spoken of by many writers as very efficacious in diseases of the urinary organs, from its diuretic qualities; these are also to be remarked in *P. erecta* and *P. diffusa;* they are said to contain more sulphur than any other plants. (Planche, *Jour. de Pharm.* viii. 367.)

Order 93.—CANNABINACEÆ.—*Lindley.*

Flowers monœcious or diœcious. Male: in racemes or panicles. Calyx herbaceous, scaly, imbricated. Stamens few, opposite the sepals; filaments filiform; anthers terminal, 2-celled, with a longitudinal dehiscence. Female: in spikes or cones. Sepals single, covering the ovary. Ovary free, 1-celled; ovule solitary, pendulous, campylotropal; stigmas 2, sessile, subulate. Fruit indehiscent, with a solitary, suspended seed. Exalbuminous; embryo hooked or spirally coiled; radicle superior.

A small order of herbaceous, rough-stemmed plants, with a watery juice, furnished with alternate-lobed, stipulate leaves, and small inconspicuous flowers. They were separated from the Urticaceæ on account of their suspended seeds, coiled embryo, and want of albumen. They are found in the temperate parts of the old hemisphere, and are cultivated in many parts of the world.

Cannabis.—*Tournefort.*

Flowers diœcious. Male: flowers racemose. Calyx 5-parted, imbricated. Stamens 5, anthers large, pendulous. Female: flowers in spikes. Sepal acuminate, rolled round the ovary. Ovary roundish, with a single pendulous ovule, and 2 long filiform, glandular stigmas. Fruit ovate, 1-seeded; embryo coiled up, with the radicle parallel with the cotyledons.

There appears to be but one species of this genus, the *sativa*, or Common Hemp, the *indica* differing from it rather in physical qualities than in botanical characters. Pereira states that he carefully compared specimens of the latter with those of the former, contained in the Linnæan Herbarium, and found the male plants identical; but that in *C. indica* the female flowers were more crowded than in those of the common hemp; he says in addition, that Mr. Anderson, of Chelsea Garden, has pointed out a distinguishing characteristic, that the *C. indica* branches from the ground, whilst the *C. sativa* does not throw out branches for some feet in height; and also that the seed of the former is smaller and rounder. In warm countries, also, there is an exudation of a resin which does not occur in Europe. These differences are evidently those of locality, cultivation, &c., and cannot be considered as specific.

C. SATIVA, *Linn.*—Annual, covered with a very fine, rough pubescence, scarcely visible to the naked eye. Stem erect, branched, green, angular. Leaves alternate, or opposite, on long, lax petioles, digitate, scabrous, with linear-lanceolate, serrated segments; stipules subulate. Flowers in axillary clusters, with subulate bracts; males lax and drooping, branched, and leafless at base; females erect, simple, and leafy at base.

Fig. 248.

C. sativa.

Linn., *Sp. Pl.* 1457; Woodville, t. 27; Pereira, *Elem. Mat. Med.* ii. 211; Royle, 550; Lindley, *Fl. Med.* 299.

Common Name.—Hemp.

Hemp is a native of Persia and the Northern parts of India, whence it has been introduced into many other countries. It is cultivated in Europe, and this country, on account of the strong fibres of its bark, so extensively employed in the manufacture of ropes. The leaves were, at one time, used in cataplasms to indolent tumours, and the oil of the seeds has been advised as an injection in colica pictonum, and when made into an emulsion, has been thought to be emmenagogue. It has been generally stated that the leaves have not the powerful properties of the Asiatic variety, but it does not appear that any fair trial has been instituted with them; if a strong resemblance in appearance, odour, and taste is to be assumed as indicating a similarity of properties, there should be no doubt of their identity of effects, except that in the variety grown in temperate and cold climates, the same intensity of action is not to be looked for, as in that inhabiting tropical regions.

The *C. sativa* var. *Indica*, appears to have been used as an intoxicating drug in Asia and Egypt from the earliest times, and is at present employed with this view, in India, under the names of *Churrus*, *Ganjah*, *Bang*, or *Subjee*, according to the preparation; by the Arabs it is called *Hashish;* by the Turks, *Malach*, and by the Hottentots, who also are fond of it, it is termed *Dachma;* and according to Martius, its narcotic and inebriating qualities are known to the negroes in Brazil.

Dr. Royle is of opinion that it may probably be the *Nepenthes* of Homer, as the intoxicating or rather the soporific and grief-assuaging qualities it possesses, agree very well with those of the drug noticed by the ancient bard. It is employed in India in a variety of forms, the most powerful being *Churrus*, or the resinous exudation from the leaves, stems and flowers; *Bang* is the larger leaves and capsules, and *Ganjah* is the whole plant in a dried state. The general effects of these, whether smoked, or taken internally in pill, decoction, &c., are alleviation of pain, great increase of the appetite, and of mental cheerfulness, aphrodisia, &c.

Within a few years, it has been brought into notice as a medicinal agent by Dr. O'Shaughnessy, who attributes to it great powers in the treatment of rheumatism, hydrophobia, cholera, tetanus, &c. In consequence of his observations it has been extensively experimented with in Europe; but the results obtained, although in general favourable to the remedial properties of the drug, are by no means in unison, or entirely satisfactory as to its exact influence on the system. (See Dunglison, *New Remedies*, 147 et seq.) It has been principally given in extract and tincture; the dose of the first is half a grain at first, gradually increasing the quantity of the tincture from 5 to 10 drops.

Humulus.—*Linn.*

Diœcious. Sterile flowers: sepals 5, oblong, concave, obtuse. Stamens 5; filaments capillary, very short; anthers oblong, vertical, 2-celled, dehiscing by 2 slits. Fertile flowers: catkin of many, imbricated, membranous, 1-flowered bracts. Calyx wanting, except a bracteole, which environs the ovary. Stigmas 2, subulate, spreading, downy. Achenium attached to the base of the enlarged, dry bracteole, roundish; pericarp hard, brittle, covered by roundish aromatic glands.

This genus contains but a single species, which is officinal.

Fig. 249.

H. lupulus.
a Male flower. *b* Female do. *c* Sepal or bracteole. *d* Bract. *e* Embryo. *f* Lupulinic gland.

H. lupulus, *Linn.*—A perennial plant, with annual, twining, angular, scabrous, sparsely hairy stems, twining from right to left. Leaves opposite, on long petioles, the smaller ones cordate, the larger 3—5-lobed, serrated, and very rough. Flowering branches axillary, angular, and scabrous. Stipules 2—4, between the petioles, ovate, reflexed. Flowers numerous, and of a greenish-yellow colour. The sterile ones very numerous and panicled. Sepals 5, oblong, obtuse, spreading, concave. Stamens short; anthers oblong, opening by 2 terminal pores. The fertile flowers, on a separate plant, in the form of an ament, with each pair of flowers supported by a bract, which is ovate, acute, tubular at base. Sepals solitary, obtuse, smaller than the bracts, and enveloping the ovary. Ovary roundish, compressed; stigmas 2, subulate, tomentose. The bracts enlarge into a persistent catkin, each of them covering a nut, enclosed in its permanent bracteole, and some grains of a yellow resinous secretion.

Linn., *Sp. Pl.* 1457; *Eng. Bot.* 427; Bigelow, *Med. Bot.* iii. 164, t. 60; Rafinesque, *Med. Flor.* i. 246; Lindley, *Fl. Med.*, 296.

Common Names.—Hop; Hop-vine.

Foreign Names.—Houblon, *Fr.*; Luppulo, *It.*; Hopfen, *Ger.*

The Hop is a native of Europe, and probably of North America, as it was found by Mr. Nuttall, plentifully, on the banks of the Mississippi and Missouri. It is also indigenous in the Canaries, and is said to occur in China. It was known to the ancients, if it is, as is supposed, the *Lupus salictarius* of Pliny. It was cultivated at an early period, for, in the ninth century, Hop grounds are spoken of as existing to some extent in Germany, and in the thirteenth in

Flanders, whence the plant was carried to England, in the reign of Henry VIII. Dr. Royle notices, as a curious fact, that at this time they were petitioned against "in regard they would spoyl the taste of drink, and endanger the people," in consequence of which it was ordered, "not to put any hops or brimstone into the ale."

The Hop is extensively cultivated in Europe, and more especially in England, and also in this country, for its aments or strobiles, which are very largely employed in the preparation of malt liquors, and more sparingly in medicine. The female flowers, when fully ripe, are picked from the vines, dried in kilns, and packed in bags. Hops consist of thin, somewhat translucent, veined, leaf-like bracts or scales, of a greenish-yellow colour, having, near their base, two small, round, dark seeds. Their odour is strong and peculiar, but somewhat narcotic and fragrant; their taste is bitter, aromatic, and a little astringent. These properties of Hops depend on the presence of a peculiar resinous secretion, contained in the glands, which is called *Lupulin*, by Dr. A. W. Ives, of New York, who first brought it forward as a medicinal agent, though it appears to have been previously noticed by observers in Europe.

Lupulin can be obtained from the Hop by threshing, rubbing, and sifting the strobiles, of which it constitutes from one-tenth to one-sixth, by weight. It is in rounded or reniform grains, of a cellular texture, golden-yellow colour, and somewhat transparent; the axis round which the cells are arranged is called the hilum. By analysis Lupulin has been found to consist of: Volatile oil, Bitter principle or Lupulite, Resin, &c. The scaly bracts contain a small portion of lupulinic matter, and the usual vegetable constituents.

The principal consumption of hops is in the manufacture of malt liquors, to which they communicate the bitter flavour and tonic properties. They have also been employed in a variety of forms in medicine.

Medical Uses.—Hops are tonic and slightly narcotic; they sometimes prove diuretic, and are said to be useful in correcting the deposits of lithic acid. They are given internally to induce sleep, to relieve restlessness, and to alleviate pain; but frequently fail in fulfilling these indications. They have, likewise, been employed externally with the same intentions; thus, a poultice of hops has occasionally been found useful in allaying restlessness and inducing sleep. In the form of a cataplasm or fomentation, they have proved beneficial to painful swellings and tumours. An ointment has been recommended as an application to cancerous sores.

When administered internally, all the good effects of hops may be obtained by the use of Lupulin; which is best given in pills, in doses of six to ten grains, or in tincture in those of half a drachm to a drachm. Lupuline may be likewise substituted for the hops in poultices, ointments, &c., with much advantage.

Order 94.—MORACEÆ.—*Lindley.*

Flowers monœcious, inconspicuous, in heads or catkins. Male: calyx wanting, or 3—4-parted, imbricated. Stamens 3—4, inserted on the base of the calyx, and opposite to its segments; filaments usually shrivelled on the inner face; anthers 2-celled, with a longitudinal dehiscence. Female: sepals 3—4—5, sometimes in two series. Ovary 1-celled, occasionally 2-celled. Ovules solitary, pendulous, or amphitropal, with the foramen uppermost; style terminal, bifid, with the lobes often unequal. Fruit, small nuts, or utricles, 1-seeded, enclosed in a succulent receptacle, or collected in a fleshy head

formed by the consolidated succulent calyx. Seed solitary, with a thin, brittle integument. Embryo in a fleshy albumen, curved.

This order consists of trees and shrubs, with a milky juice, and furnished with leaves of various forms and texture, but most generally lobed and scabrous, having large deciduous stipules. It is very closely allied to the next order, from which it mainly differs in the hooked form of the embryo. The species are natives of the temperate and warm latitudes of both hemispheres, except in Europe, where none are found truly indigenous. They are distinguished for their milky juice, which in many cases contains much caoutchouc.

Ficus.—*Linn.*

Flowers monœcious, placed on the inside of a hollow, fleshy receptacle, the extremity closed by a few scales. Sterile flowers irregular, of several unequal, membranous segments. Stamens 1—5. Fertile flowers: calyx 5-parted, membranous, converging over a simple carpel, containing a solitary suspended ovule, and terminated by a subulate style, having a bifid stigma. Seed lenticular, hard, and dry. Embryo curved in a fleshy albumen.

Fig. 250.

F. carica.
a. Section of fruit. *b*. Stamens. *c*. Styles.

A very extensive genus of tropical plants, some species of which attain an enormous size, whilst others are small and insignificant. They all abound in a milky, acrid juice, containing caoutchouc; this is perceptible even in the common Fig. Many of them bear edible fruits, as that of the *F. carica*, or common Fig, so common, in a dried state, as an article of dessert. It is a native of Asia, but is now cultivated in all temperate climates. The fruit, when ripe, is sweet, high-flavoured, and wholesome; but if eaten to excess, occasions flatulence and diarrhœa. There are numerous varieties, distinguished by their form, size, and colour. In general, the fruit is solitary, axillary, more or less pear-shaped, of a yellowish colour, and a mild, mucilaginous saccharine taste. The larger proportion of them are used in a dried state, in which form they are imported from the Mediterranean, and principally from Smyrna, packed in boxes or drums. They are more or less compressed, and usually covered with a whitish saccharine powder. The dried fig is much more saccharine than the fresh, and consists principally of mucilage and sugar. They are laxative, demulcent, and nutritious, and are mainly employed in medicine to act gently on the bowels in habitual constipation, but also enter into the composition of some confections and electuaries. Roasted and split, they are some-

times used as poultices to gum-boils, and other circumscribed maturating tumours.

One of the most celebrated species is the *F. indica*, or Banyan Tree, a native of the East Indies, and considered as sacred by the Brahmins. The branches of this tree spread to a great extent, and send down roots, which, striking root, and enlarging in diameter, become new trunks, so that it may gradually cover a great extent of ground. Roxburgh states, that he has seen them full five hundred yards in extent, the main trunk being twenty-five feet to the first branch, and eight or ten feet in diameter. Gum-lac is obtained from it; its white, acrid juice, is considered efficacious in toothache, and the bark is regarded, by the Hindoos, as a powerful tonic, and useful in diabetes. A still more venerated species is *F. religiosa*, or Pippul tree, the Brahmins fabling that their god Vishnu was born under its branches. *F. dæmona* of India, is pervaded by an extremely poisonous juice, and the leaves of *F. septica* are emetic, and its fruit so acrid as to be used to destroy fungous flesh. The bark of *F. racemosa* is astringent, and has been reputed to be efficacious in hæmaturia and menorrhagia. The juice of the root is a powerful tonic (*Ainslie*, ii. 30). *F. elastica* furnishes caoutchouc in India, *F. radula*, *elliptica*, and *prinoides* in South America. The juice of some is very bland, and Lindley states, that some of the Cow-trees, as they are called, from their potable juice, are of this genus. The *F. sycamorus* furnished the imperishable wood of which the Egyptian mummy cases were constructed.

Dorstenia.—*Linn.*

Monœcious; flowers on a fleshy receptacle, usually flat and expanded, variable in form. Sterile: on the surface of the receptacle, 2-lobed, fleshy, diandrous. Fertile: immersed, also mostly 2-lobed. Ovary 1—2-celled, with a solitary suspended ovule in each cell; style 1; stigma 2-lobed. Seeds lenticular, embedded in the receptacle, projected from it elastically, when ripe.

A genus of dwarf herbaceous plants, with scaly rhizomes, peculiar to the West Indies and South America. Their rhizomes have long been known under the name of *Contrayerva*, and attributed, by the various Pharmacopœias, to one species, but it has been shown by Houston, Martius, and others, that the roots of several kinds are confounded under this appellation.

1. D. brasiliensis, *Lam.*—Root oblong, woody, præmorse, aromatic. Stemless. Leaves cordate, oblong, obtuse, crenulated, serrated or toothed, cucullate at base. Scape as long as the petioles. Receptacle orbicular, somewhat cup-shaped, crenated at the margin.

Lamarck, *Encyclop.* ii. 314; Lindley, *Fl. Med.* 300; *D. cordifolia*, Swartz, *Fl. Ind. Occ.* 275; *D. tubicina*, Hooker, *Bot. Mag.* 2804; *Caapeba*, Marcgrave.

A native of Brazil and several of the West India Islands. Martius states, that this species is far more efficient than the *D. contrayerva*, and that it grows on mountains and not in low places, as is the case with the other plants of the genus. The tuberous root is employed as an antidote against the bites of poisonous snakes, and in nervous fevers and general debility. It sometimes acts as a mild emetic. It is much more powerful when fresh than when it has been kept any time.

Fig. 251.

D. contrayerva.

2. D. CONTRAYERVA, *Linn.*—Caulescent; stem covered with spreading, green, scaly stipules. Leaves palmate; lobes lanceolate, acuminate, coarsely serrate, and gashed, sometimes almost pinnatifid. Receptacle on a long footstalk, quadrangular, waved or plaited.

Linn., *Mat. Med.* 53; Willdenow, *Sp. Pl.* i. 683; Jacquin, *Amer.* iii. 614; Lindley, *Fl. Med.* 300.

Occurs in Mexico, Peru, the West Indies, &c. This is the officinal species.

3. D. DRAKENA, *Linn.*—Stemless. Leaves cordate, interruptedly pinnatifid, with the segments ovate, entire, acute. Receptacle oval, entire.

Willdenow, *Sp. Pl.* i. 683; Miller, *Dict.* No. 3; Houston, *Trans. Roy. Soc.*; Lindley, *Fl. Med.* 301.

Grows in Mexico, in the vicinity of Vera Cruz. Lamarck considers it to be a mere variety of the last, but it differs in many essential characters from that species. This is much employed in Mexico, and was the source of the roots sent by Drake from Peru, to Clusius, who described them in his *Exotica*, 311.

4. D. HOUSTONI, *Miller.*—Stemless. Leaves cordate, entire, or palmately angular, acute. Receptacle quadrangular, undulated.

Miller, *Dict.* No. 2; Willdenow, *Sp. Pl.* i. 682; Houston, *o. c.*; Lindley, *Fl. Med.* 301.

Found in high rocky ground in Campeachy, and forms part of the Contrayerva of commerce.

The roots of these plants have long been in use in South America and the West Indies under the name of *Contrayerva*, which means counter-poison. The first account of them is by Clusius from Monardes; in 1581 he described another root received from Sir Francis Drake, under the name of *Drakena radix*, which is supposed to be that of *D. drakena.* As found in the shops, it consists of præmorse rhizomes of an inch or two long, rough, hard and scaly, with numerous radicles attached to the lower part. It has a somewhat aromatic odour, and a slight bitterish, warm taste. It yields its properties to alcohol and boiling water. They depend on a Volatile oil, Resin, and Bitter extractive. They evidently are those of *D. brasiliensis* and not of *D. contrayerva*, which Pereira says is not met with in commerce.

Medical Uses.—Contrayerva is a stimulant tonic and diaphoretic, much resembling Serpentaria in its properties, and by which it has been superseded in practice, being seldom employed in this country. The dose in powder is a scruple to half a drachm. The best form of administration is the infusion.

Other species have been noticed: thus, Gomez describes *D. arifolia*, which has the properties of *brasiliensis*, but is not as active. Descourtilz (*Flor. Med. Antill.* iv. 105) speaks of *D. caulescens* of Haiti as having the qualities of *Parietaria.*

The different species of Morus, as the *nigra* of Europe, and *rubra* of this country, bear edible fruits, which are laxative and cooling; their bark is said to be cathartic and anthelmintic. *M. alba* has a vermifuge root, but is most important on account of its leaves being the favourite food of the silk-worm. The wood of *M. tinctoria* is well known in commerce under the name of Fustic, and is much used as a yellow dye. A native plant, *Maclura aurantiaca*, has a tinctorial wood, which is very hard and elastic, and is much used by the Indians for bows, whence its common name of Bow-wood. The inner bark of *Broussonetia papyrifera*, or Paper Mulberry, is generally employed in the South Sea Islands in the manufacture of clothing.

Fig. 252.

Morus nigra.

Order 95.—ARTOCARPACEÆ.—*Lindley.*

Flowers monœcious, in dense heads. Sterile: calyx sometimes wanting, and having the stamens mixed with scales; or of 2—4 sepals, often united in a tube, with only a rudiment of a limb. Stamens opposite the sepals, and usually equal in number to them; filaments sometimes connate; anthers 2-celled, erect or incumbent, rarely peltate. Fertile flowers variously arranged on a fleshy receptacle of different forms; calyx tubular, limb 2—4-cleft or entire. Ovary free, 1-celled; ovule erect and orthotropal, or amphitropal and parietal, or pendulous and anatropal; style lateral or terminal, usually bifid, if undivided, with a lateral or radiating stigma. Fruit variable, having a fleshy involucre, or composed of aggregated fleshy calices, containing numerous nuts. Seeds erect, parietal or pendulous. Embryo with albumen, straight.

A strictly tropical order containing many important plants, though few have any medicinal properties. They are all trees or shrubs abounding in a milky juice, with alternate, simple, oftentimes lobed leaves, having large deciduous stipules. The most useful species are those of *Artocarpus* or Bread-fruit, which furnish so large a proportion of the food of the South Sea Islanders. Although all the species afford an edible fruit, the most esteemed is produced by *A. incisa* and its numerous varieties. That of *A. integrifolia* or Jack fruit is much inferior, though also used. The famous Cow Tree or Palo de Vacca of South America, which yields a copious supply of a rich and wholesome fluid resembling milk, is a species of *Bromisum;* another plant of this genus, *B. alicastrum*, abounds in a tenacious, gummy milk. The seeds known under the name of Bread Nuts are much esteemed in Jamaica as an article of food. A decoction of the leaves of *Cecropia peltata* is said by Dr. Ricord Madiana to be an antidote to the poison of *Passiflora quadrangularis* (*Ann. Lyc. Nat.*

Fig. 253.

A. incisa.

Hist. i. 131), and Piso (*Bras.* 72), that it is astringent and useful in diseases of the bowels. A decoction of the leaves of *Musanga cecropioides* is said to be a powerful emmenagogue (Tucker, *Expedit.*); the seeds are edible. *Phytocrene gigantea*, a large tree of Birmah, is stated by Wallich to discharge a large quantity of a pure and wholesome fluid when an incision is made in the trunk. The fruit of *Pourouma bicolor* is sub-acid and mucilaginous, and, according to Martius, worthy of cultivation. *Castilloa elastica* affords caoutchouc, and the beautiful wood known as Snake-wood, is the product of *Piratinera guianensis.*

One of the most virulent plants yet discovered is the *Antiaris toxicaria* or Upas tree of Java, and although the accounts of its fatal influence have been much exaggerated, it has been fully established that it is extremely poisonous. Mr. Leschenault states that a man he persuaded to ascend one of the trees, suffered severely, not only with an eruption and swelling of the body, but also from vertigo, nausea and vomiting; other persons experience no inconvenience from the exhalations. It is stated by Lindley, that the fatal effects of the juice when administered internally, are owing to the presence of Strychnia, but MM. Pelletier and Caventou (*Ann. Chim.* xxvi. 44) were unable to detect this alkaloid in it. Cloth manufactured from the tough fibres of its bark, will excite the most excessive itching and irritation in those that wear shirts made of it. Blume is of opinion that this poison acts principally on the vascular system, but from experiments made with it in Europe, it evidently operates powerfully on the cerebro-spinal apparatus. Notwithstanding its virulence, it has been employed medicinally, but even in very minute doses is apt to produce the most excessive vomiting and purging.

From another species of *Antiaris*, sacks are made in Western India, by detaching the bark in an unbroken piece from a section of a branch or trunk, by beating the latter with clubs until the fibre is loosened, and then stripping it off entire.

Group XXXIX.—Amentales.

Order 96.—ALTINGIACEÆ.—*Lindley.*

Flowers monœcious, in rounded aments or heads. Females on longer peduncles than the males, which are surrounded by a deciduous, 4-leaved involucre. Male: anthers numerous, oblong, nearly sessile, destitute of calyx, but having a few minute scales. Female: ovaries 2-celled, collected into a globe, each surrounded by a few scales. Styles two, long. Ovules indefinite, attached to the dissepiment; amphitropal. Fruit a kind of strobile, formed of the indurated capsules and scales. Capsules 2-celled, 2-beaked, opening between the beaks, several-seeded (or 1-seeded by abortion). Seeds compressed, membranous, winged, peltate, with a little fleshy albumen. Embryo inverted. Radicle short, superior.

This small order contains but one genus, *Liquidambar*, the species of which are tall trees yielding a balsam, and having alternate, simple or lobed leaves, with glandular serratures at the edge, and furnished with deciduous stipules. They are natives of the warmer parts of Asia, the Levant, and North America, in the latter of which one species is found as high north as 42° latitude. It was at one time supposed that these trees furnished the Styrax of commerce, but this idea is now shown to be erroneous; they, however, afford a liquid balsam, of a somewhat analogous character, and which appears to have been much more in use formerly than at present. This balsam,

which is known under the name of Liquidambar, Liquid styrax, Copaline balsam, &c., is derived from three of the species. Most of that used in Europe comes from the Levant by way of Trieste, and is furnished by *L. orientale;* some is also brought from India, and is produced by *L. altingia;* and part is sent from Mexico, where it is obtained from the *L. styraciflua*, or Sweet gum, which species is also found in the United States, but produces scarcely any balsam, except in the most southern parts of the country. By boiling the branches, a small quantity may be obtained; from some experiments I made a few years since in the vicinity of Baltimore, where this tree abounds, I found that it existed in the largest proportion, just before the appearance of the leaves, and in young trees.

Fig. 254.

L. styraciflua.

Liquidambar, when pure, is about the consistence of honey, of a yellowish colour, of a pleasant balsamic odour, and a bitter, hot, acrid taste. It has the properties of the other balsams, but is seldom employed in this country.

Order 97.—SALICACEÆ.—*Lindley.*

Flowers diœcious, amentaceous, naked, or with a membranous, cup-like calyx. Male: stamens distinct or monadelphous. Anthers 2-celled. Female: ovary superior, 1-celled or imperfectly 2-celled. Ovules numerous, erect, anatropal. Styles or stigmas two, often 2-cleft. Fruit a sort of follicle, opening by two valves. Seeds numerous, ascending, covered with long, silky hairs, springing from their base, exalbuminous. Embryo erect. Radicle inferior.

Trees or shrubs, with alternate, simple leaves, frequently with glands at the edge, or on the petioles, furnished with deciduous or persistent stipules. They are natives of the temperate and cold regions both of the northern and southern hemispheres. This order contains many species that are valuable on account both of their medicinal qualities, and of their use in the arts. They all have a more or less bitter bark, which is astringent and tonic, and contains two peculiar principles, termed *Salicine* and *Populine*, tannin, &c.

Salix.—*Linn.*

Flowers diœcious, rarely monœcious, amentaceous, each with a single flexible bract; a gland around the stamens or ovary. Male: stamens 1—5 or more. Anthers 2-lobed, with a longitudinal dehiscence. Female: ovary ovate, 1-celled, many-seeded. Style terminal, permanent. Stigmas two. Capsule ovate, 1-celled, with two revolute, concave valves. Seeds numerous.

A large genus, principally peculiar to the temperate and cold regions of both hemispheres. The bark is tonic and astringent, and was employed at a very early period, being spoken of by Dioscorides; it appears to have been occasionally used, but did not attract much attention from the profession until about 1763, when it was brought forward as a remedy in intermittents, since which time it has been frequently prescribed. The number of species of Willow is very great, and as in all of them the bark is analogous, differing only

in some degree in bitterness, they may all be considered as medicinal. The British Colleges recognise as officinal, *S. fragilis*, *S. alba*, and *S. capræa*, but other European species are fully as efficient, as *S. helix*, *S. russelliana*, *S. pentandra*, and *S. purpurea*. The United States Pharmacopœia, therefore, only recognises the genus without designating the particular species. Among our native Willows, *S. nigra*, *S. eriocephala*, and *S. conifera*, are, perhaps, the most efficient. Michaux speaks of the first of these as affording a powerful bitter root employed as a preventive and cure in intermittents.

Willow bark varies in appearance and qualities, according to the species from which it is obtained, and the age of the plant. When dried, it is usually in rolled pieces, is fibrous, somewhat flexible, and difficult to pulverize. It has a slight aromatic odour, and a bitter, astringent, but peculiar taste. It has been often analyzed, and the honour of having discovered its active principle is claimed by several chemists, as Buchner in Germany, Fontana and Rigatelli in Italy, &c. Salicin is obtained by several processes, one of which, proposed by Messrs. Tyson and Fisher (*Jour. Phil. Coll. Pharm.* iii. 214), is simple, and gives good results.

Salicin is in silky or scaly crystals, of a white colour, is soluble in water and alcohol, but not in ether. These solutions are neutral, but exceedingly bitter. If sulphuric acid be added to it, a blood-red colour is produced. It possesses tonic properties analogous to the sulphate of quinia, and is said to be less liable to offend the stomach, and affect the nervous system. Notwithstanding the praises bestowed on it by some writers for its febrifuge powers, it is far inferior in this respect to quinia; and the opinion of it expressed by Ballard and Garrod (*Mat. Med.* 399) I agree in fully, namely, that it is inefficient as a tonic, when compared to the Cinchona alkaloids; as a simple bitter, however, it appears to rank with Gentian, Calumba, &c., its principal good effect being seen in the improved appetite which sometimes follows its use. It may be mentioned that Quinia is often adulterated with this substance, and that it has been imported for this purpose; but the fraud may always be detected by testing with sulphuric acid. The dose is from ten to thirty grains.

Populus.—*Linn.*

Male: ament cylindrical, loosely imbricated. Bract single-flowered, cuneate, lacerated. Calyx turbinate, oblique, entire. Stamens eight or more, very short, capillary. Anthers drooping, large, quadrangular. Female: flower as in male. Ovary ovate, pointed. Style none. Stigmas four or eight, subulate. Capsule 1-celled, with two concave valves. Seeds numerous, small, ovate, beset with long wool.

These are trees, with roundish, often cordate leaves; the petiole often biglandular; the buds sometimes balsamiferous, the floral ones appearing earlier than the leaves. The species are most numerous in North America. The bark resembles that of the Willows, and has the same properties; that of *P. tremuloides* has been employed in domestic practice with some success as a febrifuge and tonic. In *P. balsamifera*, it is said to be cathartic, and to be useful in rheumatism and gout. The buds of most of the species are aromatic and abound in a balsamic juice, especially in *P. balsamifera;* this is collected, and has received the name of *Tacamahaca*, from its resemblance to the resinous product of the *Fagara octandra*, which bears that appellation. This balsam is said to be diuretic and antiscorbutic. The buds of the European species are used in the preparation of an ointment in France, &c., which has much reputation in the treatment of wounds, bruises, and tumours.

Order 98.—MYRICACEÆ—*Lindley.*

Flowers monœcious or diœcious; both kinds achlamydeous and amentaceous. Sterile flowers: stamens 2—8 in the axil of a scale-like bract, anthers 2—4-celled, with a longitudinal dehiscence. Fertile: ovary 1-celled and 1-ovuled, surrounded by several hypogynous scales, in the axil of a bract; stigmas 2, subulate or dilated and petaloid. Fruit dry and drupaceous, often covered with a waxy secretion. Seed solitary, erect, exalbuminous. Radicle short, superior.

Small trees or shrubs, with alternate, simple leaves, with or without stipules. They, as well as the branches, are covered with resinous glands or dots. The species are found in both Americas, Cape of Good Hope, and India. One species is also a native of Europe. They are all aromatic, and are generally possessed of astringent and tonic properties.

Myrica.—*Linn.*

Sterile aments ovate-oblong; bracts loosely imbricated. Calyx of 1—2 subulate scales. Stamens 4, with short, capillary, erect filaments. Anthers vertical, large, with 2 divided lobes. Fertile aments like the sterile, but more compact. Sepals 2, ovate, acute, scale-like. Ovary ovate, flattish, superior. Stigmas 2, filiform, spreading, longer than the calyx. Fruit baccate, 1-celled, 1-seeded. Seed erect.

This genus consists of aromatic shrubs and small trees, having alternate, mostly entire leaves, covered with resinous dots. They are natives of North and South America, Cape of Good Hope, and Europe. In some of them the fruit is covered with a wax-like, aromatic coating.

M. cerifera, *Linn.*—Leaves cuneate-lanceolate, with a few acute serratures near the top. Sterile aments loose. Bracts acute. Fruit spherical.

Linn., *Sp. Pl.* 1453; Torrey, *Comp.* 372; Bigelow, *Med. Bot.* iii. t. 43; Marshall, *Arbust.* 94; Lindley, *Flor. Med.* 305.

Common Names.—Wax myrtle; Wax-berry; Bayberry, &c.

This species is found in damp places in many parts of the United States; it is very abundant in New Jersey. The hard berries are studded over with small, black granulations, and covered by a white, mealy crust, consisting of a kind of wax. This can be separated, by placing the berries in boiling water, when it will melt and collect on the surface of the fluid, and, on becoming cool, congeal into a concrete substance, of a pale-green colour, agreeable odour, more brittle than wax. This is employed in some parts of the country for candles, and also forms the basis of a fine soap. It appears to have astringent and slightly narcotic properties, and was successfully employed by Dr. Wm. Fahnestock in an epidemic of typhoid dysentery. He gave it in doses of one or two drachms, and is of opinion that its active principle is the green colouring matter (*Am. Jour. Med. Sci.* ii. 313). Rafinesque states that a tincture of the berries with *Heracleum* is beneficial in flatulent colic.

The bark of the root is acrid and stimulant, and in doses of a drachm causes a sensation of heat in the stomach, followed by vomiting, and sometimes diuresis. When chewed, it acts as a sialagogue, and has proved useful in toothache. The powder is an active errhine. The leaves have some celebrity in domestic practice as antispasmodic, antiscorbutic, and astringent. The other native species, *M. pennsylvanica*, *M. carolinensis*, and *M. gale*, probably are very similar in their properties. The last-named species is

also indigenous in Europe, where an infusion of the berries is thought to be efficient in the cure of itch, and as a vermifuge. In Sweden, the leaves are used as a substitute for hops in brewing. The fruit of *M. sapida*, of Nepaul, is large as a cherry, and is said to be pleasantly acid and edible. *M. cordifolia*, of the Cape of Good Hope, furnishes a wax, which Thunberg states is eaten by the natives.

Comptonia.—*Aiton.*

Fig. 255.

C. asplenifolia.

Flowers monœcious, amentaceous. Sterile: in long, cylindrical, loosely imbricated catkins, with deciduous, 1-flowered bracts. Stamens 6, adhering in pairs. Fertile: in ovate, densely imbricated catkins, with 1-flowered bracts. Sepals 6, larger than the bracts. Styles 2, capillary. Fruit an ovate, 1-seeded nut.

The only species of this genus is a native of the United States. It was considered by Linnæus to belong to *Liquidambar*, and was included in *Myrica* by Gronovius.

C. asplenifolia, *Aiton.*—Shrubby. Leaves sessile, narrow-lanceolate, somewhat pinnatifid, brown and rather downy beneath, and shining above.

Aiton, *Hort. Kew.* iii. 334; Willdenow, *Sp. Pl.* iv. 320; Barton, *Veg. Mat. Med.* i. 221, t. 19; Rafinesque, *Med. Flor.* i. 115.

Common Names.—Sweet Fern; Fern-bush; Spleenwort Gale, &c.

It is a low shrub, which has an aromatic fragrance when rubbed or bruised between the fingers. It is very common throughout the United States, and is much employed in domestic practice, though seldom prescribed by physicians. Schoepf, on the authority of Colden, states that masticating the root will check a spitting of blood, and also that it is useful in rachitis and the debility succeeding to fevers. Its true character seems to be that of a mild astringent tonic, and hence has proved useful in diarrhœa. Dr. W. P. C. Barton says that he found a weak decoction of it, properly sweetened, a grateful drink to children suffering from the summer complaint, and a useful auxiliary in the treatment of this disease. It is used in some parts of the country as a fomentation in rheumatism and contusions.

Group XL.—Quernales.

Order 99.—CORYLACEÆ.—*Lindley.*

Flowers generally monœcious; sterile flowers in aments, with a scale-like or regular calyx, and the stamens 1—3, the number of its lobes. Fertile flowers solitary, 2—3 together or in clusters, with an involucre which encloses the fruit, or forms a cup at its base. Ovary crowned by the rudiments of the adherent calyx, 2—6-celled, with 1—2 pendulous ovules. Stigmas several, subsessile, distinct. Fruit a bony or coriaceous 1-celled nut, more or less enclosed in the involucre. Seed solitary, exalbuminous. Embryo large, with fleshy cotyledons. Radicle minute, superior.

This very important order is composed of trees and shrubs, with alternate, simple, straight-veined leaves, having deciduous stipules. They are found in the temperate regions of both continents. Some are natives of tropical countries, but only on high lands. The main property of the order is astringency, depending on the presence of tannin and gallic acid. A narcotic principle, which has been called *Fagine*, is found in the husks of the *Fagus sylvatica* or Beech. The nuts of most of the species are edible, as those of the Chestnut, Hazel, and some kinds of Oak. In some, again, they are bitter and unpleasant. In a memoir by Mr. Duhamel (*Amer. Jour. Pharm.*), he states that Dr. Henbener, of Bethlehem, had employed the short, rigid hairs of the involucre of *Corylus rostrata* as a substitute for those of *Mucuna*, and found them to be equally anthelmintic.

Quercus.—*Linn.*

Flowers monœcious, amentaceous. Sterile flowers, with membranous bracts, 4—5- or more cleft. Stamens 5—10, short, subulate. Fertile flowers: involucre hemispherical, imbricated, coriaceous, 1-flowered. Calyx in 6 minute, sharp, downy segments, closely surrounding the base of the style. Ovary globose, 3-celled, with 2 ovules in each. Style solitary, short and conical; stigmas 3, obtuse, recurved. Nut single, oval, coriaceous, indehiscent, 1-celled, attached by a broad scar to the involucre. Embryo solitary; radicle superior.

A very large and important genus, principally of trees, rarely shrubs, with evergreen or deciduous leaves, which are entire or sinuately lobed. A large proportion of the species are natives of North America. They are of far greater use in the industrial arts, than as affording medicinal agents, their general character being that of astringents. It would be useless to attempt even to enumerate the species, and therefore only such of the species as have been employed in medicine, will be noticed.

1. Q. alba, *Linn.*—Leaves oblong, pinnatifid-sinuate, pale or pubescent beneath; lobes oblong, obtuse, mostly entire; cup deep, tuberculate; gland ovate.

Willdenow, *Sp. Pl.* iv. 448; Michaux, *N. A. Syl.* i. 17; Torrey, *Comp.* 359; Barton, *Comp. Fl. Phil.* ii. 171.

Common Names.—White Oak.

A large tree, found in all parts of the Union, but most common in the Middle States, and much esteemed for its wood, which is extensively employed in ship building. The bark is officinal in the U. S. Pharmacopœia. When prepared for use it is deprived of its epidermis; it then presents a coarse fibrous texture, is tough, and separates into short filaments when attempted to be pulverised. It is of a yellowish-brown colour, has but little odour, and

an austere bitterish taste. It contains Tannin, Gallic acid, and Extractive, the former of which predominates. A decoction of it is employed as an astringent in diseases of the bowels, in certain hemorrhages, and as a wash in prolapsus ani, hæmorrhoids, &c.; as an injection in leucorrhœa and gonorrhœa; as a bath in diseases of children, where a tonic impression is wished to be made, and the condition of the stomach contra-indicates an internal use of remedies; it is also beneficial as a gargle in a relaxed condition of the fauces, and in an aphthous state of the mucous membrane. Externally it is useful as an application to flabby and ill-conditioned ulcers; and a poultice of the ground bark has proved of service in gangrene and mortification.

2. Q. TINCTORIA, *Michaux.*—Leaves ovate-oblong, slightly lobed, pubescent beneath; lobes oblong, obtuse, mucronate; cup flat; gland depressed-globose.

Michaux, *N. A. Syl.* i. 91; Willdenow, *Sp. Pl.* iv. 444; Torrey, *Comp.* 357; Barton, *Comp. Fl. Phil.* ii. 168.

Common Names.—Black Oak, Quercitron, &c.

This is one of the largest of our native species, and is of great importance from its bark forming an article much employed for its tinctorial qualities, and largely exported under the name of *Quercitron.* It should be noticed, however, that the barks of several other species are indiscriminately used for this purpose, as those of *Q. falcata*, *Q. rubra*, &c. This is officinal in our Pharmacopœia, but is not as much employed internally as that of the White Oak, being apt to irritate the bowels. Where an external astringent is required, it is preferable to that species, from containing more tannin and gallic acid. Several other American oaks afford barks of similar properties to the *alba*, and may be substituted for it, as *Q. prinos*, *Q. palustris*, *Q. bicolor*, *Q. montana*, &c.

Fig. 256.

Q. pedunculata.

a. Male catkins. *b.* Stamens. *c.* Female involucre and stigmas. *d.* Young fruit. *e.* The same magnified. *f.* A cotyledon with the radicle.

3. Q. PEDUNCULATA, *Willdenow.*—Leaves sessile or on short petioles, obovate-oblong, sinuated; lobes entire or nearly blunt; cup hemispherical; gland oblong, obtuse, much longer than the cup.

Willdenow, *Sp. Pl.* iv. 450; Lindley, *Fl. Med.* 291; *Q. robur*, *Eng. Bot.* 1342; Stephenson and Churchill, iii. 151.

Common Names.—English Oak; Common Oak.

A large tree, found in most parts of Europe, and remarkable for its longevity. It was well known to the ancients, and was considered as sacred by most of them. The medical properties of its bark are noticed by Galen and Dioscorides, the latter of whom speaks of the astringent character of its inner bark. This is employed in the same manner and for the same purposes as that of the *Q. alba.* Another European species, *Q. sessiliflora*, has similar properties.

4. Q. INFECTORIA, *Olivier.*—Leaves ovate-oblong, sinuate-dentate, very smooth, deciduous; cup hemispherical, scaly; gland long, obtuse, much longer than the cup.

Olivier, *Voyage*, ii. 64, t. 14, 15; Willdenow, *Sp. Pl.* iv. 436; Stephenson and Churchill, iii. 152; Lindley, *Fl. Med.* 291.

Common Names.—Gall Oak.

This is a small tree or shrub peculiar to Asia Minor, and is celebrated from its affording the Gall nuts of commerce. All the oaks bear these excrescences, but except in this and a few other species, they are light and spongy, and comparatively of little value. They are produced in the same manner, namely, by the puncture of the buds by a fly to form a nidus for its eggs. In this instance it is a species of *Diplolepis* that thus wounds the plant. In consequence of the puncture, irritation is induced, the juices of the tree flow to the part, and a semi-organized tumour is formed round the larva, which, when it has attained maturity, perforates the gall and escapes.

These excrescences were known to Hippocrates, and are described by Dioscorides but as the fruit of the Oak. Galls are imported from the Mediterranean ports, but originally are derived from various places in Asia Minor. There are several kinds or qualities recognised in commerce: the dark-coloured, which are the most valued, consist of the gall when it has attained its full growth, but before it is pierced by the insect to escape; these are tumid, and termed green, blue, or black, according to their tint; the light-coloured or white galls are such as have been gathered after their perforation by the fly, and are considered inferior, being less heavy and compact. The best qualities are also known under the name of Aleppo Galls, and a secondary grade under that of Smyrna. Of late years a third kind has appeared for sale, imported from India. These, Dr. Royle states, are derived originally from Bassorah, and further says, that when Dr. Falconer was travelling in the Punjab, he was informed that galls were produced on the Balloot Oak, *Q. ballota.*

Galls are spherical, of various sizes, having numerous small tubercles on their surface. The best are of a bluish or greenish colour externally, and grayish within; hard, solid, with the exception of a small cavity in the centre, formerly occupied by the insect. They are without odour, but have a very astringent, bitter taste. They yield their properties both to water and alcohol, but most readily to the former solvent. They contain much tannin and gallic acid, with the usual constituents of vegetable bodies. Braconnot has discovered another acid, which he calls Ellagic, but it is doubtful whether it is not a product, rather than an educt.

From the quantity of Tannin and Gallic acid contained in Galls, they are

powerfully astringent, but are seldom administered internally, though sometimes given in cases of obstinate chronic diarrhœa. In the form of infusion they are used as a gargle, injection, or wash, and are also frequently employed in the form of an ointment, made with one part of galls very finely powdered, to six or eight parts of lard; this has been found very beneficial in hæmorrhoidal tumours. The infusion or tincture is a good antidote in cases of poisoning by the vegetable alkaloids.

5. Q. SUBER, *Linn.*—Leaves ovate-oblong, entire, serrate, tomentose beneath; bark fissured, spongy.

Linn., *Sp. Pl.*, 1070.
Common Names.—Cork tree; Cork oak.

The Cork tree is a native of the southern part of France, Spain, Portugal, and Barbary. Although it can scarcely be said to afford any medicinal substance, the important uses of its bark in pharmacy, renders it proper to notice it. This bark consists of several layers, the second of which is composed, almost exclusively, of cellular tissue; this is light, porous, and elastic, and is well known under the name of Cork. The bark is naturally detached from the tree when it has attained a certain age; but, in such case, is not as well fitted for use, as when artificially removed, which can be done without injury to the tree, as the liber is not separated from the subjacent wood. It would be out of place to advert to the numerous uses of Cork in the arts, in which no good substitute for it has yet been discovered. It was at one time employed in medicine, and was thought to act as a styptic when applied in the form of powder. It has also been thought beneficial, when burnt, and formed into an ointment with sugar of lead and lard, as an application to hæmorrhoids.

Fig. 257.

Q. suber.

Several other species of oak have attracted notice for their properties or products. The acorns of *Q. ægilops* are used by dyers, under the name Velonia; and those of *Q. ilex* form an article of food in many parts of southern Europe. *Q. mannifera*, of Koordistan, secretes, during hot weather, a large quantity of saccharine matter from its leaves, which is made into sweetmeats. (Lindley, *Veg. King.* 291.) *Q. coccifera* is infested with an insect belonging to the genus Coccus, from which the Kermes is prepared, so much employed in dyeing scarlet, before the introduction of cochineal.

ORDER 100.—JUGLANDACEÆ.—*Lindley.*

Flowers monœcious. Sterile flowers in aments, with membranous, oblique, and irregular bracts. Stamens indefinite. Fertile flowers few, clustered with the ovary, adherent to the ovary, the limb small, 3—5-parted, sometimes with as many small petals. Ovary 2—4-celled at base, 1-celled at the apex. Ovule solitary, erect, on the point of a

central column; styles 1—2, very short; stigmas 2—4, unequal, fringed, sometimes sessile and 4-lobed. Drupe 1-seeded, the sarcocarp fibrous-fleshy and coherent or coriaceous and dehiscent. Nut 2-valved or valveless. Seed erect, exalbuminous, 2—4-lobed at base, and partially divided by dissepiments. Cotyledons oily. Radicle short, superior.

These are all trees, with a watery or resinous juice, and furnished with alternate, pinnate, exstipulate leaves. They are principally natives of North America; a few occur in Asia, among which is what is here called the English Walnut, so generally cultivated in Europe for the sake of its nuts. The bark of most of them is acrid and purgative, as is also the rind of the fruit.

JUGLANS.—*Linn.*

Monœcious. Sterile ament imbricated; bracts usually 5-parted; calyx 5—6-parted; stamens 18—36. Fertile flowers, with the calyx 4-cleft, superior; corolla of 4 minute petals; styles 1—2. Drupe with a fibrous-fleshy, indehiscent sarcocarp; nut more or less rugose, irregularly furrowed.

These are large trees, mostly natives of North America, but the original species, *J. regia*, on which the genus was founded, is indigenous to the borders of the Caspian Sea. One species is officinal in the U. S. Pharmacopœia.

J. CINEREA, *Linn.*—Leaflets numerous, lanceolate, serrate, rounded at base, soft-pubescent beneath; petioles villous. Fruit oblong-ovate, with a terminal projection, viscid and hairy, but oblong, acuminate; deep, and irregularly furrowed.

Linn., *Sp. Pl.;* Torrey, *Comp.* 357; Bigelow, *Med. Bot.* ii. 115, t. 32; Carson, *Pereira, Mat. Med.* ii. 761; Lindley, *Flor. Med.* 307; *J. cathartica*, Michaux, *N. A. Sylva*, i. 160.

Common Names.—Butternut; White Walnut.

This tree, which is inferior in size to the Black Walnut, is found much more plentifully in the Northern and Western than in the Middle States. In the spring it abounds in a saccharine juice from which a good sugar can be made. The fruit, when quite young, is made into pickles; but are not equal for this purpose to those of the English walnut. The kernel of the ripe nut is oily, but pleasant-tasted. The bark is employed for dyeing wool; it is very acrid, and in a fresh state will inflame the skin. The officinal portion is the inner bark, especially of the root, and should be collected in May or June. It has a fibrous texture, a slight odour, and a bitter sub-acrid taste. It yields its properties to boiling water. Dr. Carson states that Mr. S. Wetherill found in it: Fixed oil, Resin, Saccharine matter, Lime, and Potass, a peculiar principle, (extractive?) and Tannin. Dr. Bigelow, in his examination of it, detected neither tannin or resin.

Medical Uses.—Butternut is a pleasant and mild cathartic, somewhat of the character of Rhubarb, and is well suited to cases of costiveness, and other bowel affections. It has obtained much celebrity in the treatment of dysentery. It is always given in extract or decoction, never in substance. The dose of the extract is from five to twenty grains, according to circumstances. Dr. B. S. Barton was of opinion that it possesses somewhat of an anodyne property (*Collections*). A decoction is said to be efficacious in murrain of cattle, and yellow-water in horses.

The *J. nigra*, or Black Walnut, has a styptic and acrid bark, seldom used except for tinctorial purposes. The rind of the unripe fruit is said to remove

Fig. 258.

J. regia.

ringworm and tetter; and a decoction has been given as a vermifuge with some success.

J. regia, or English Walnut, is well known for its edible nuts, and is frequently cultivated on this account. In its native country it is stated by Spencer, (*Trav. in Circassia, &c.*,) to afford a sweet, clear juice, which is considered to be valuable in diseases of the lungs and general debility. The very young fruit, bruised, and formed into a conserve, by boiling with sugar, forms a mild purgative; in a more advanced stage they are much used for pickling. The rind has been recommended as an anthelmintic. From the kernels much oil is extracted, especially in Cashmere, where, according to Mr. Vigne (*Travels in Kashmir*), 12,000 ass loads of them are annually employed in this way. The oil is used both for food and for burning.

The other plants of this order have little interest in a medical point of view, but the timber of the different species of *Carya* is well known under the name of Hickory, and is much esteemed on account of the hardness and elasticity of the wood. Their leaves are usually aromatic, and are stated to possess antispasmodic properties. Their bark is tinctorial, and in those species having bitter nuts, as *C. amara* and *C. porcina*, is somewhat astringent. Some of them bear fruit that is much esteemed, as that of the *C. olivæformis* or Peccan nut, and *C. sulcata* or Shellbark.

Group XLI.—Euphorbiales.

Order 101.—EUPHORBIACEÆ.—*Jussieu.*

Flowers monœcious or diœcious, arranged in various ways, often in an involucre resembling a calyx. Calyx inferior, with various glandular or scaly internal appendages (sometimes wanting). Corolla absent, or consisting of petals or scales equal in number to, or more than the sepals, or monopetalous. Stamens definite or indefinite, distinct or monadelphous; anthers 2-celled, sometimes opening by pores. Ovary of 2—9 more or less united carpels, usually stalked; styles as many as carpels, distinct, coherent or wanting; stigma compound, or single with many lobes. Fruit usually tricoccous, of 3 carpels, usually opening elastically by one or both sutures, sometimes fleshy and indehiscent. Seeds with a large embryo, in a fleshy albumen, suspended, often with an aril.

This very extensive order is most abundant in tropical regions, but species are to be found in all parts of the world, from 50 to 60 being natives of North America. It consists of trees, shrubs, and herbs, some of which are leafless, succulent plants, of a deformed unsightly appearance. A great number of them are poisonous; the deleterious principle residing in a milky secretion, and in many cases is proportionate to the quantity of the fluid; but this is not always the case, as in some instances they yield caoutchouc, and the source whence this article is obtained is principally the *Siphonia elastica*, but numerous plants, both of this and other orders, likewise afford this substance. The order has been divided into several tribes, most of which include medicinal plants.

Tribe 1. PROSOPIDOCLINÆ.—Ovule 1. Seeds with an aril; exalbuminous? Involucre globose, bladder-like, opening on one side, deciduous, containing from 3—6 flowers, which are diœcious and apetalous.

Little is known respecting the plants of this group.

Tribe 2. EUPHORBIÆ.—Ovule 1. Seeds albuminous. Flowers monœcious, apetalous, sexes mixed in a cup-like involucre.

EUPHORBIA.—*Linn.*

Flowers in monœcious clusters, contained in an involucre, formed of a 5-cleft leaf, with 5 glands alternating with the divisions. Sterile flowers, monandrous, articulated with their pedicel, surrounding the central fertile flower, which is naked and solitary. The ovary is pedicellate, with 3 forked stigmas. Fruit hanging out of the involucre, formed of 3 cocci, bursting elastically at the back, and each containing a single suspended seed.

This very extensive genus contains so many species having active properties, that it would require a volume to notice them at any length. Their general character is that of acridity, in some, to such a degree as to be poisonous, whilst in others it is merely sufficient to render them emetic, cathartic, &c.; and in some again it is so diminished, that their juice is mild and nutritious, as in the *E. balsamifera*, which is eaten in the Canary Islands. (*Nees and Eberm.*) The succulent, leafless, or nearly leafless species, are almost all very active, and afford a resinous juice known as *Euphorbium*, and employed from a very early period as an emetic and purgative; it is noticed by Dioscorides and Pliny, and appears to have been much in vogue at one time, but is now seldom prescribed on account of its exceedingly irritating powers; it is not known with certainty which species furnished it, but it has been ascribed to the following.

1. E. ANTIQUORUM, *Linn.*—Branches spreading, triangular or quadrangular; angles sinuated and armed with double spines at the protuberances. Peduncles single or in pairs; 3-flowered. Stamens 5.

Fig. 259.

E. antiquorum.

Linn., *Sp. Pl.* 648; Rheede, *Hort. Malabar.*, ii. t. 42; Lindley, *Flor. Med.* 192.

A native of India, Arabia, &c. This species is stated by Rheede to have a purgative bark, and many authors are of opinion that it furnishes some of the Euphorbium, but it is said by Hamilton (*Trans. Linn. Soc.* xiv.), and Royle (*Mat. Med.* 541), to be comparatively inert.

2. E. CANARIENSIS, *Linn.*—Shrubby, erect. Branches with from 3—4 angles, armed with double, hooked, dark, shining spines. Flowers somewhat sessile, below a pair of spines, having an ovate, concave, green bract on each side.

Linn., *Sp. Pl.* 646; Willdenow, *Sp. Pl.* ii. 882; Lindley, *Fl. Med.* 192.

A native of the Canary Islands, and recognised by the Dublin Pharmacopœia as the officinal species, and likewise stated by Martius to be the origin of the gum-resin, but, as is observed by Pereira, this cannot be the case, as this article does not come from these islands, but from Morocco.

3. E. OFFICINARUM, *Linn.*—Stems short, tufted, naked, prickly, with many angles; spines in pairs, short, thick, and strong.

Linn., *Sp. Pl.* 649; De Candolle, *Pl. Grass.* 647; Stephenson and Churchill, iii. 142; Lindley, *Fl. Med.* 192.

A native of Africa and Arabia, recognised by the London and Edinburgh authorities as producing Euphorbium, and may perhaps be the plant spoken of by Jackson (*Morocco*) under the name of *Dergmuse*. Whether it is this plant or not, it is certainly very active, as Forskäl states 7 or 8 drops of the milk will purge actively.

Some other of the succulent species are equally powerful. According to Ainslie (*Mat. Ind.* ii. 134), the juice of *E. tirucalli* of India is caustic, and will cause violent vomiting and purging. Sonnerat states that the milk is prescribed mixed with flour as a remedy in syphilis (*Ency. Met.*) The juice of *E. tribuloides* is employed in the Canaries as a sudorific. (De Candolle, *Essai*, 260.) That of *E. heptagona*, a native of Africa, is said by Virey to be so virulent that the milk is used for the purpose of poisoning arrows by the natives.

Nor are the species with conspicuous leaves less efficient and dangerous in many instances. Some of them, however, are useful remedial agents, and two of them are recognised as officinal in the U. S. Pharmacopœia.

4. E. IPECACUANHA, *Linn.*—Root irregular, succulent, of great length, sometimes extending to a depth of 6—7 feet. Stems numerous, erect or procumbent, dichotomous, white below the surface, red, pale-green, or yellow above. Leaves opposite, sessile, of various forms, but usually oval, entire except at the apex, which is sometimes emarginate; stipules small, cordate. Flowers on single 1-flowered peduncles, varying in length. Seeds 3, in as many cocci.

Linn., *Sp. Pl.* 653; Bigelow, *Med. Bot.* iii. 108, t. 52; Barton, *Veg. Mat. Med.* i. 213, t. 18; Lindley, *Med. Flor.* 195.

Common Names.—Wild Ipecac; American Ipecacuanha, &c.

Found in many parts of the United States, especially in dry, sandy soil. The root, which is the part employed, is milky when fresh, and in the dried state is light and brittle, of a grayish colour externally, white within, without odour, and of a somewhat sweet, not unpleasant taste. No correct analysis of it has been made; Dr. Bigelow judged from his experiments that it contained Resin, Caoutchouc, Gum, and probably Starch; this latter was found in some quantity in it by Mr. Cullen.

This root was spoken of as emetic by Schœpf, Puihn, Dr. B. S. Barton, and others, but does not appear to have attracted particular notice until Dr. W. P. C. Barton announced it "as equal in importance, if not, on some accounts, superior to the common Ipecacuanha of the shops." The experience of subsequent experimenters with it does not coincide with this; and it is now generally considered as a tolerably certain and energetic emetic, but like all its tribe, apt to operate on the bowels, and in over-doses, to act with extreme violence. The dose is from ten to fifteen grains. Dr. Barton states, that in small quantities it determines to the skin.

5. E. COROLLATA, *Linn.*—Root large, branching. Stems several, erect, round, sometimes simple. Leaves scattered, sessile, oblong, obovate, or linear, somewhat revolute at the edges, either smooth or a little hairy. Umbel 5-rayed, with as many bracteal leaves. Rays repeatedly trifid or dichotomous, each fork with 2 bracts and a flower. Involucre large, rotate, white, with 5 obtuse, petal-like segments, with 5 interior, very small obtuse ones. Many of the plants are wholly staminiferous.

Linn., *Sp. Pl.* 658; Bigelow, *Med. Bot.* iii. 119, t. 53; Rafinesque, *Med. Flor.* i. 181; Lindley, *Fl. Med.* 196; Zollickoffer, *Amer. Jour. Med. Sci.* and *Jour. Phil. Coll. Pharm.* v. 163.

Common Names.—Milkweed; Ipecac; Bowman's Root, &c.

This is also a native of the United States, and in some places is very abundant, usually in a dry sandy soil. The root, which is the officinal part, is inodorous and almost tasteless. Its examination by Dr. Zollickoffer, who introduced it to the notice of the profession, gave the same results as those obtained by Dr. Bigelow in the last-mentioned species.

It has the same properties as the *E. ipecacuanha*, but is more active, and is therefore objectionable in many cases, from its tendency to cause hypercatharsis. It acts as an emetic in doses of fifteen or twenty grains, and as a diaphoretic in those of three or four grains. The recent root, contused and applied to the skin for a few moments, will create a pustular eruption.

Fig. 260.

E. corollata.

6. E. HYPERICIFOLIA, *Linn.*—Annual. Stalk somewhat procumbent, smooth, dichotomous. Leaves opposite, oblong, somewhat falciform, serrated, often marked with purple spots. Flowers small, terminal, fasciculate.

Linn., *Sp. Pl.* 652; Torrey, Comp. 331; Zollickoffer, *Am. Jour. Med. Sci.* and *Jour. Phil. Coll. Pharm.* v. 70; Rafinesque, *Med. Flor.* i. 183.

Common Names.—Milkweed; Black Purseley, &c.

Common in all parts of the United States, in gardens, fields, &c. The whole plant is stated by Dr. Zollickoffer, who first introduced it into the Materia Medica, to be astringent and narcotic. It has a somewhat sweetish taste, followed by a sensation of austereness. It is directed to be given in infusion made with half an ounce of the dried plant to a pint of boiling water. This, Dr. Zollickoffer has found very beneficial in dysentery, in doses of a tablespoonful every hour. He also used it in menorrhagia and fluor albus in wineglassful doses twice a day with success.

In addition to the above, many other species are deserving of a short notice. The *E. lathyris*, or Caper Spurge, often found in gardens, but whose native country is unknown, was much employed as a purge in former years; the bark of the root and stems acts both as an emetic and purgative, but the seeds were generally employed, and are said to have been used to procure abortion. In the old Pharmacopœias it is called *Cataputia minor*, and is one

of the plants ordered by Charlemagne to be grown in every garden. The seeds afford much oil, which has been highly spoken of by Calderini, and others, as a mild purgative in doses of 6 or 7 drops. In trials made with it in this country, it was found always to induce nausea, and even vomiting. (Scattergood, *Jour. Phil. Coll. Pharm.* iv. 124.) *E. ligularia*, of India, is said to be alexipharmic, for which purpose the root is mixed with black pepper. (*Roxburgh.*) *E. nereifolia*, also an East India plant, is spoken of by Ainslie (*Mat. Ind.* ii. 97), as used by the Hindoo practitioners as a purgative and deobstruent, and also as proving diuretic. Externally it is employed, mixed with Margosa oil, in contracted limbs. Loureiro says it is an unsafe remedy. *E. capitata*, of Brazil, is praised by Piso (*Bras.* 102), as very efficacious in the bites of venomous snakes; it is given internally, and also applied to the wound. Ainslie (ii. 14) speaks of it as useful in aphthous affections.

The root of *E. gerardiana*, of Europe, is cathartic and emetic, and is said by Deslongchamps (*Man. Pl. Indig.* 2), to be the best and safest of the European species. *E. esula*, also a native of Europe, is very acrid, and according to Scopoli (*Flor. Carn.* 435), has caused death in a dose of thirty grains. *E. peplis*, *E. peplus*, *E. falcata*, &c., of Europe, purge actively, and *E. cyparissias* is a virulent poison, having in more than one instance destroyed life. Hooker (*Brit. Fl.* 326) says that *E. hibernica* is used in some parts of Ireland to poison fish, and that it is so powerful that a small basket of it will stupefy these animals for several miles down a river. *E. piscatoria* is employed in the same way in Asia. *E. pityusa*, of Southern Europe, is highly spoken of by Deslongchamps, and others, as a purgative. According to Ainslie, *E. thymifolia*, of India, is a little aromatic and astringent, and is used by Tamool physicians as an anthelmintic, and in certain bowel affections of children, and Forskäl states, that it is esteemed as a vulnerary among the Arabs.

Several of the species have been thought beneficial in syphilitic complaints, as *E. parviflora* and *hirta* in India, *E. linearis*, in South America, *E. hibernica* and *canescens* in Europe. It may, in fact, be stated that no species of this numerous genus is destitute of active properties.

Besides *Euphorbia*, other genera of this tribe are possessed of remedial properties; thus *Pedilanthus tithymaloides*, of the West Indies and South America, is employed in venereal cases, and is also esteemed as an emmenagogue. Descourtilz states that it has the properties of Ipecacuanha in doses of 12 to 15 grains.

Tribe 3. HIPPOMANEÆ.—Ovule single. Flowers apetalous in spikes; bracts 1, many-flowered.

Most of the plants of this tribe are active and poisonous, and several have been employed as medicines, though none of them are officinal in the British or U. S. Pharmacopœias. *Hura crepitans*, or the Sand Box tree of tropical America, has an exceedingly acrid juice, a drop of it applied to the eye will cause blindness. The seeds are a drastic and dangerous purgative. The *Hippomane mancinella*, or Manchineel, of the same regions, is still more poisonous. A drop of the juice will almost immediately produce a blister when applied to the skin. The fruit, which resembles a small apple, has a pleasant smell, but is so acrid as to destroy the skin of the lips if attempted to be eaten, and if swallowed, induces violent inflammation of the stomach. The juice of *Sapium aucuparium*, a native of Colombia, is also venomous, and the emanations from it will induce an erysipelatous inflammation; these properties are common to another species, *S. indicum*, found on the shores of the Ganges. The seeds are employed to intoxicate fish. The juice of *Excæcaria agallocha*, of the East Indian Archipelago, causes severe inflammation

and ulceration, and the smoke of it, when burnt, will induce severe ophthalmia. The sap of *Commia cochinchinensis* is said by Loureiro to be emetic, purgative, and deobstruent, and has proved useful in dropsy and visceral obstructions.

Others of this tribe are possessed of milder qualities. *Maprounea brasiliensis* yields a black dye, and a decoction of the root is given in derangement of the stomach (*St. Hilaire*). The juice of *Colliguaja odorata* is acrid, but the wood exhales a pleasant odour when burnt. *Stillingia sylvatica*, or Yaw Root, of the Southern States, is stated to be purgative, alterative, and anti-syphilitic, and is employed in obstinate cutaneous affections and lues venerea (Barton, *Collections*). *S. sebiferum*, or Tallow-tree of China, has become naturalized in South Carolina and Georgia. Its berries are coated with a white, tallow-like substance, which is employed in China to make candles, and is useful instead of lard in ointments; when mixed with oil of mustard, it is prescribed as an external application in India in fevers (*Ainslie*, ii. 433).

Fig. 261.

S. sebiferum.

Tribe 4. Acalypheæ.—Ovule single. Flowers apetalous, in clustered spikes or racemes.

The roots of *Tragia involucrata* are considered by Hindoo doctors to be an excellent alterative; and Rheede says that a decoction of it is useful in suppression of urine. That of *T. cannabina* is deemed diaphoretic and alterative (*Ainslie*, ii. 367); and *T. volubilis*, of Jamaica, according to Browne (*Jam.* 336), is diuretic and aperient. *Mercurialis perennis* and *annua*, of Europe, are poisonous, producing the usual symptoms of the acro-narcotics, yet the leaves appear to have formerly been used as a pot-herb. Several species of Acalypha have been deemed medicinal: the root of *A. indica* gives a cathartic decoction, whilst that of the leaves is gently laxative. *A. betulina* is much esteemed in India as a stomachic in dyspepsia and cholera, and also as an alterative. A native species, *A. virginica*, is stated by Elliott (*Sketches*) to be a good expectorant and diuretic. The juice of *Omphalea triandra* turns black in drying, and is used for ink in Guiana; the fruit, as well as that of *O. diandra*, is edible, and affords an oil, which is said to be of service in parturition; the flowers are astringent (*Flor. Antill.* ii. 52). Nees and Ebermaier refer the bitter and tonic Alcornoque bark to *Alcornea latifolia*, but Humboldt states that it is furnished by *Bowdichia*.

Tribe 5. Crotoneæ.—Ovule single. Flowers usually with petals; in clusters, spikes, racemes, &c.

Croton.—*Linn.*

Flowers monœcious, rarely dicœcious. Calyx 5-parted. Sterile flowers: Petals 5. Stamens 10 or more, distinct. Fertile: Petals wanting. Styles 3, in 2 or more divisions. Capsule tricoccous.

This large genus consists of herbaceous and shrubby plants, with stipulate, alternate, or rarely opposite leaves, with a stellate pubescence. They are principally natives of the warmer parts of America and India. Their properties are very various, and many are important as medicinal agents.

1. C. cascarilla, *Linn.*—Flowers dicœcious, in short, dense, terminal, downy spikes. Leaves variable in breadth, linear, entire, obtuse, mucronate at tip, smooth on the upper

surface, covered with a scaly down beneath; 2—3 glands at base, hidden by the yellowish tomentum.

Linn., *Sp. Pl.* 1424; Willdenow, *Sp. Pl.* iv. 531; Lindley, *Fl. Med.* 179; *C. lineare*, Jacquin, *Amer.* 256, t. 162, f. 4.

This species, which is a native of the West Indies, was generally supposed to yield *Cascarilla* bark; but it has been clearly shown by Dr. Lindley that such is not the case; in this opinion he is supported by Dr. Wright, who states that this species is a native of Jamaica, and that it has none of the sensible properties of Cascarilla. It may be stated, in addition, that neither Sloane nor Jacquin notices any bitter aromatic qualities in the present plant. My own observations in the West Indies coincide with these. But although Cascarilla is not the product of this species, it is likely, as Guibourt suggests, that it may be obtained from more than one of the others; it certainly is by the following.

2. C. ELEUTERIA, *Swartz.*—A small tree. Branches angular, somewhat compressed, downy, ferruginous, striated. Leaves petiolated, alternate, ovate, with a short, obtuse point, entire, faintly nerved, green above, with a few scattered grayish dots, silvery, and very tomentose beneath; petioles short, scurfy. Racemes axillary and terminal, with numerous subsessile flowers; sterile above, fertile below. Stamens 10—12.

Swartz, *Fl. Ind. Occ.* ii. 1183; Stephenson and Churchill, 150; Lindley, *Fl. Med.* 180; Pereira, *Mat. Med.* ii. 229; Royle, *Mat. Med.* 534.

A native of many of the West India Islands, and furnishes the Bahama Cascarilla. This bark, according to Pereira, was first mentioned by Stisser in 1686 (*De Machin. fumiduct.*), it being at that time mixed with tobacco for smoking. Royle states it was made known by Garcias in 1692, since which it has always maintained a place among the legitimate articles of the Materia Medica. As found in the shops, it is either in rolled fragments of various sizes, having a whitish or whitish-gray epidermis, beneath which it is of a brown colour, the inner surface being of a chocolate tint; or it may be in very thin fragments, not covered by an epidermis, and often with laminæ of wood adhering to the inner surface, as if the bark had been removed from the plant by means of a sharp instrument. This variety is probably the product of another species; the first agrees with the bark identified by Dr. Lindley as produced by the *C. eleutheria*;* may not the second be obtained from *C. micans*, which is stated by Nees to yield Cascarilla?

This bark has a peculiar aromatic odour, which is much increased by friction, or by the action of heat, and a warm, spicy, bitter taste. From an analysis by Mr. Duval, it appears to contain Albumen, Tannin, a Bitter, crystallizable substance, which he terms *Cascarilline*, Red colouring matter, Volatile oil, Resin, &c. (Royle, *Mat. Med.* 534). The Cascarilline is white, odourless, bitter, sparingly soluble in water, but readily so in alcohol and ether. The bark yields its properties to alcohol, and partially so to water. It is a stimulating tonic, and was at one time much employed as a substitute for Cinchona, but is now mainly restricted to cases where a more stimulating article is required, as in dyspepsia, and chronic diseases of the bowels. It is in some instances a useful addition to the more purely tonic bitters. The

* Dr. Lindley (*Veg. King.* 279) says the question is now set at rest, from the receipt of authentic specimens, with the following note from Mr. Lees, Chief Judge in the Bahamas: "The plant is scarcely known here by the name of Cascarilla, but is commonly called Sweet-wood Bark, and often Eleuthera Bark, because it is chiefly gathered on the island of Eleuthera. It is the only bark receiving the name of Cascarilla exported from the Bahamas."

dose of the powder is from ten grains to half a drachm, but it is more generally prescribed in infusion.

3. C. PSEUDO-CHINA, *Schlecht.*—Young shoots covered with a dense, brown scurf. Leaves large, cordate-ovate, obtusely acuminate, 3—5-nerved, nearly or quite entire, green and smooth above, silvery, and scaly beneath; petioles scurfy, silvery, half the length of the leaves. Racemes axillary, simple; flowers monœcious, with 5 sepals, 5 petals, and 10—15 stamens.

Schlechtendahl, *Linn.* v. 84; Lindley, *Fl. Med.* 180; *C. cascarilla*, Don, *Edinb. Phil. Journ.* xvi. 368.

Indigenous to the *Terra caliente* or warm country of Mexico, and according to Deppe, furnishes the *Quina blanca* or *Copalchi* bark of Xalapa, and in his opinion, the Cascarilla of European commerce. Don also assumed it as certain that it affords this product, and therefore proposed to change the name to *C. cascarilla.* But it has been satisfactorily shown that Copalchi bark differs in many respects from Cascarilla, though allied to it in its properties. It was supposed at one time, that this bark was derived from *C. suberosum* of Humboldt, which is employed in Peru as an aromatic purgative. It should be noticed that another bark is known in South America under the name of Copalchi, and is supposed by Virey and Guibourt to be yielded by *Strychnos pseudo-quina.*

4. C. TIGLIUM, *Lam.*—A middle-sized tree. Young branches terete, smooth, shining, somewhat furrowed towards the extremities. Leaves oval-oblong, acute, 3—5-nerved at the base, acuminate at the point, with small glandular serratures, and having 2 glands at base, covered, especially when young, with stellate, sparse hairs. Petioles furrowed. Racemes terminal, erect. Flowers downy, sterile, with a 5-cleft calyx, 5 lanceolate, woolly petals, and 15 distinct stamens; fertile, with a 5-cleft, permanent calyx, and long and bifid styles. The capsules are oblong, obtusely triangular, about the size of a hazel-nut; 3-celled, each with a solitary seed.

Fig. 262.

C. tiglium.

Lamarck, *Encyclop.* ii. 208; Roxburgh, *Fl. Ind.* iii. 682; Stephenson and Churchill, i. 4; Lindley, *Fl. Med.* 181; *C. jamalgota*, Hamilton, *Trans. Linn. Soc.* xiv. 258.

A native of India, and cultivated in some parts of the West Indies. It

yields some of the seeds from which Croton oil is prepared, and is recognised as the officinal species. These seeds are very much the shape of the Castor oil bean, of a dark yellowish-brown, or even blackish; when the epidermis has not been removed, they are yellowish. The inside is of a whitish-yellow colour, oleaginous, odourless, with at first a mild and oily taste, which soon becomes acrid and burning. They are powerfully cathartic, and are used in India, after having been slightly roasted, and their testæ removed; about a grain, or half a seed will cause full purgation. They owe their powers to the presence of a fixed oil, in combination with a peculiar acid, the *Crotonic*, and to a brown soft resin. In Europe and this country, the oil only is employed; this is known under the name of Croton oil, and is a compound of many of the constituents of the seeds. When pure and fresh it is nearly colourless, but by age becomes viscid and yellowish. It has a feeble but unpleasant odour, and an acrid taste, which is very lasting.

Croton oil is a violent drastic purgative, capable, in over-doses, of destroying life. It is applicable to cases where it is of importance to make a speedy and powerful impression on the bowels, and where the patient has difficulty in swallowing. It is also beneficial in obstinate costiveness, or a torpid condition of the digestive canal. It has likewise proved of much service as a revulsive, in affections of the head.

It has of late been much used as an external counter-irritant, to relieve diseases of internal organs, especially in affections of the respiratory passages. It causes rubefaction, and if continued, or employed in an undiluted form, creates a pustular eruption. When applied in this way it sometimes acts on the bowels, and in children has caused severe purgation. The dose of the oil is from 1 to 3 drops; usually given in the form of a pill, or in emulsion, but the first form is preferable.

The oil found in commerce is not solely obtained from the seeds of the *C. tiglium*, as some of that from India, as well as part of the seeds themselves, are derived from *C. pavana*, and perhaps from *C. polyandrum*. The former of these are, in the opinion of Dr. Hamilton, the original Tiglium or Tilly seeds, the *Grana moluccana* of Rumphius; the latter are called *Jamalgota* in India, in common with those of the *C. tiglium*, and *C. pavana*. (See Dunglison's *New Remedies*, 481.)

Numerous other species of Croton are possessed of active properties: *C. draco* of Mexico furnishes a red juice, which hardens into a fine variety of Dragon's blood, and is used in its native country as a vulnerary and astringent; the same kind of product is derived from *C. sanguifluus* and *C. hibiscifolius*, of South America. *C. lacciferum* of Ceylon, has an aromatic and purgative bark; its juice is aromatic, and employed as a vulnerary, whilst its branches furnish a small quantity of fine lac. *C. balsamiferum* also has a resinous juice, which, like that of the last species, is said to be vulnerary, and is used as such in some of the West India Islands. A spirituous liquor, called *Petit baume*, is distilled from it in Martinique, and is said to be beneficial in irregular menstruation. *C. perdicipes* of Brazil is there employed in syphilis, and as a diuretic; whilst the *C. campestris* of the same country is purgative, but likewise deemed remedial in venereal disorders.

C. thurifer and *C. adipatum* of South America yield a resin resembling frankincense; *C. humilis* is esteemed for its aromatic properties in the West Indies, as is *C. gratissimus* at the Cape of Good Hope. *C. origanifolius* affords a balsam somewhat like Copaiva, whilst its leaves and bark are sudorific. *C. antisyphiliticum* is very stimulating, and even dangerous in over-doses; according to Martius, the leaves are made into cataplasms and

applied in cases of bubo, and an infusion of its leaves given internally in syphilis in Brazil. (*Jour. Chim. Med.* v. 424.)

RICINUS.—*Linn.*

Flowers monœcious. Calyx 3—5-parted, valvate. Sterile: stamens numerous, unequally polyadelphous. Fertile: style short. Stigmas 3, deeply bipartite, oblong, fringed, coloured. Ovary globose, 3-celled, with an ovule in each cell. Fruit mostly aculeate, capsular, tricoccous.

A genus of trees, shrubs, and herbs, with alternate, stipulate, palmate, peltate leaves, having glands at the end of the petiole: the flowers are in terminal panicles; the lower male, the upper female. They are natives of India, Africa, and the West Indies, and one species has become naturalized in most warm climates.

• R. COMMUNIS, *Linn.*—Leaves palmate-peltate. Lobes lanceolate, serrate. Stem herbaceous, pruinose. Stigmas 3, bifid. Capsule aculeate.

Linn., *Sp. Pl.* 1430; Woodville, t. 61; Stephenson and Churchill, i. 50; Lindley, *Fl. Med.* 183.

Common Names.—Castor-oil bush; Palma Christi.

Description.—Plant glaucous, very variable in size; in the United States it is an annual of about 5 or 6 feet in height, whereas in tropical countries it attains the size of a small tree, and is perennial. Root long, thick, and fibrous. Stems round, thick-jointed, furrowed, of a purplish colour above. Leaves large, deeply divided into seven or nine segments, on long, tapering, purplish footstalks. Flowers in long, green, glaucous spikes, springing from the divisions of the branches. Capsules prickly. Seeds ovate, shining, of a gray colour, marbled with black.

Fig. 263.

R. communis.

a Stamens. *b* Anther. *c* Stigmas. *d* Capsule. *e* Seed. *f* Embryo.

This species is a native of India, and has become naturalized in many warm climates; it is extensively cultivated in many parts of the United States. Willdenow has considered the perennial varieties as specifically different from the annual, but as no other difference than such as are caused by climate are discoverable, he is evidently in error. It is certain that seeds of the

arboreous Palma Christi of the West Indies, will produce herbaceous plants in this country, differing in no respect from those in common cultivation.

The Castor oil was known in the earliest ages, since Caillaud found some of the seeds in Egyptian sarcophagi of the most remote antiquity. It is considered, by many eminent writers, to be the plant spoken of in Scripture, and which, in our translation, is called *Gourd* (*Jonah*, chap. iv.) It is noticed by Herodotus and Hippocrates, the latter of whom employed the root. By the Romans, it was called *Ricinus*, from a fancied resemblance of its seeds to the dog-tick.

The oil is obtained from the seeds by decoction, by expression, or by alcohol; the former of these modes is pursued in the East and West Indies, and is apt to afford an acrid and irritating product; the second, which is that pursued in this country, when properly conducted, gives a bland and colourless result; the third has been tried in France, and although the oil thus obtained is very pure, it is apt to become speedily rancid. Scarcely any oil is imported; what is used being made in this country, whence large quantities are sent abroad. Castor oil is of a thick, viscid consistence, almost colourless, or of a slight yellow colour, with a faint but unpleasant odour, a mild and nauseous taste, succeeded by a feeble sensation of acrimony. It is heavier than most of the fixed oils. When exposed to the air it gradually thickens. When pure it is soluble in its own volume of alcohol. It consists of Volatile oil, several Fatty acids, Glycerine, &c.

Medical Uses.—It is a mild cathartic, operating promptly without griping, and acting rather as a mere evacuant, than in increasing the intestinal secretions. It is admirably calculated for children, delicate or pregnant females, and also for all cases where it is merely wished to open the bowels, or where they are in an irritated condition, precluding the use of other purgatives. The only disadvantage attendant on the administration of this remedy, is the extreme disgust it occasions in a majority of persons, not from its taste, but from the unpleasant and nauseous sensation created in the throat and fauces from its adhering to them. Various modes have been devised to obviate this, by mixing it with hot coffee, milk, &c.; the best plan, where the stimulus is not contra-indicated, is to mix it with the froth of porter. In infants, the best plan is to float it on the surface of hot mint or cinnamon water.

The dose, for an adult, is about a fluid ounce; for an infant, from one to four fluid drachms. It has been stated that its cathartic action is not in a ratio with the dose, and that a teaspoonful or two will often operate as effectually as a larger quantity. (Dunglison, *Therap.* i. 164.)

A vast number of species, belonging to this tribe, are possessed of much interest in a medical point of view; but it would be impossible to notice them all, even in the briefest manner, within the limits assigned to this work. The following are, however, of too much importance to be passed over. The seeds of *Anda gomesii* are employed in Brazil as a purgative, two or three acting safely and speedily; Martius states, that in emulsion they seldom create nausea. The oil from them has been tried here, and it was found that 50 drops would open the bowels, and a larger quantity would induce several discharges. (Smith, *Phil. Jour. Pharm.* iv. 27.) The bark is lactescent, and is used to intoxicate fish; when toasted, it is considered very effectual in diarrhœa. *Siphonia* and *Hevea* afford the Brazilian and Surinam caoutchouc. The nuts of *Aleurites triloba* are considered, in Java, to be aphrodisiac when they are roasted; in a fresh state, they are purgative.

The oil from them is used in Tahiti for burning. *A. laccifera* furnishes Gum-lac in Ceylon. The seeds of *Elæcocca verrucosa* of Japan, and *E. vernilia* of China, afford oil too acrid to be used for food; but that from the first is good for burning, and of the latter for painter's work.

The different species of *Jatropha* and *Curcas* all produce seeds abounding in an acrid and purgative oil; that from *J. glauca*, is stated, by Ainslie, to be much esteemed by Hindoo practitioners as an external application in chronic rheumatism and paralysis. The seeds of *C. purgans* are very active, and have been called Purging nuts; their oil is sometimes sold as Croton oil, and has been beneficially used as an external irritant. Those of *C. multifida* act as an emeto-cathartic, and it is said that their operation is brisk, but without inconvenience; any inordinate action being checked by the administration of a glass of wine. Among the most important plants of this tribe is the *Janipha manihot*, or Mandioc, so extensively cultivated in all tropical countries for the sake of its roots; these sometimes attain an enormous size, and in a recent state are poisonous, being filled with a deleterious juice; this is removed by crushing or grating the roots, and pressing the pulp. As the poisonous principle is volatile, any that remains is driven off in cooking the comminuted mass. This juice is, however, used as a condiment, under the name of *Cabion*. According to Martius, an acre of Manioc yields as much food as six acres of wheat. The flour obtained from these roots is toasted on iron plates, and in this state is called Cassava, and forms a healthy and nutritious food. The fecula is what is called *Tapioca*. Another species or variety, *Janipha aipi*, is said, by Pohl, to have a harmless root, and is probably the sweet Cassava of Lunan, (*Hort. Jam.*)

Fig. 264.

Janipha manihot.

Tribe 6. PHYLLANTHEÆ.—Ovules in pairs. Stamens in the centre of the flower.

The bark of the *Briedelias* is astringent, especially that of *B. spinosa*, which, besides its tonic power, is reputed to be anthelmintic (*Roxburgh*). In *Cluytia collina* of India, according to the same authority, the rind of the capsule is exceedingly poisonous. The *Andrachne cadishaw* is very deleterious, but its leaves are employed as a caustic to ill-conditioned ulcers, (*Ainslie*, ii. 487.) Several species of *Phyllanthus* are likewise made use of in India: *P. niruri* has a bitter and astringent root, successfully prescribed in jaundice; half an ounce rubbed in milk, given twice a day, is said to effect a cure in a few days; and both it and the young shoots are said to be diuretic; the leaves are very bitter, and are a good stomachic, (*Ainslie.*) Martius states that they are employed in Brazil as a specific in diabetes. A still more powerful diuretic action is produced by *P. urinaria*. The leaves, flowers, and fruit of *P. simplex*, made into an electuary, with sugar and cummin seeds, is thought, in India, to be efficacious in gonorrhœa, in doses of a teaspoonful a day. The fresh leaves, bruised with buttermilk, make a wash that will cure itch. The bark of *P. virosus* is a powerful astringent, and will stupefy fish.

The fruit of *Emblica officinalis*, formed one of the kinds of Myrobolans of the older Physicians; when fresh, they are acid and astringent, and when dry, act on the bowels. They are much employed in India, made into

a decoction with a solution of salt, in gout, diseases of the liver, and as a vermifuge; the flowers are laxative, (*Ainslie*, ii. 41.) In *Cicca disticha*, the leaves are diaphoretic, the seeds cathartic, the fruit subacid, cooling and edible, and the root a violent purgative.

Tribe 7. Buxeæ.—Ovules in pairs. Stamens inserted beneath the sessile rudiment of the ovary.

The leaves of *Buxus sempervirens*, or Common Box, are bitter and nauseous, sudorific and purgative. The wood was, at one time, much used as a substitute for Guaiacum, and a fetid oil obtained from it, enjoyed considerable reputation in a variety of diseases. The wood, as is well known, is much prized by wood-engravers for their blocks. The root of *Fluggæa leucopyrus* is esteemed astringent, but its fruit is edible, (*Ainslie*, ii. 245.)

Class II.—Gymnogens or Gymnospermous Plants.

Stems increasing by concentric layers, and with a structure as in the Exogens, except that the vessels of their wood have large apparent perforations or disks. Embryo with two opposite or several whorled cotyledons. Ovules naked, or not enclosed in an ovary; the carpel being absent or replaced by a flat scale.

Order 102.—CYCADACEÆ.—*Lindley.*

Flowers dicœcious, with no trace of calyx or corolla. Sterile: collected in terminal cones, consisting of scales, having their lower side covered with 1-celled anthers, which have a longitudinal dehiscence. Pollen hyaline, angular, in masses. Fertile: consisting of naked ovules, beneath peltate scales, or at the base of flat ones, or on the margins of contracted leaves. Seeds hard or spongy-coated nuts, with 1 or more embryos suspended by a long funiculus in a central cavity of large fleshy or mealy albumen; cotyledons unequal, more or less connate; radicle superior.

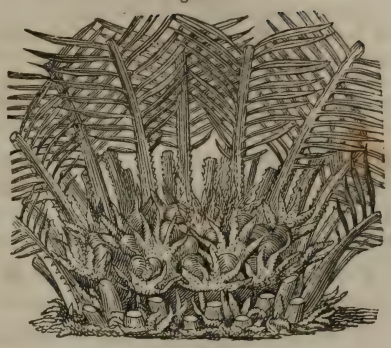
Trees or shrubs somewhat resembling the Palms in aspect. The stems are simple and cylindrical, and marked with lozenge-shaped scars, from the broad, woody leaf-stalks. Internally consisting of a mass of pith, traversed by bundles of woody fibre, and rings of ligneous matter, variously disposed. The leaves are pinnate, hard and woody, perennial, usually circinnate when young; leaflets with delicate simple veins, and are placed obliquely on their petiole, from which they finally disarticulate.

They are natives of the tropical and temperate regions of Asia and America, but not found in equinoctial Africa, though occurring at the Cape of Good Hope and Madagascar. At a former period they must have existed in Europe and North America, as is attested by the abundance of their fossil remains in the coal measures of these countries. They all abound in a nauseous, mucilaginous juice, and many of them also in much fecula, which forms articles of food to the inhabitants of their native countries.

A kind of Sago, known as Japan Sago, is procured from the cellular substance filling the interior of the stem of *Cycas circinalis*. This species grows in the Moluccas, Japan, &c. The pith is said to be very nourishing, and is held in great esteem in Japan, and it is contrary to the laws of that country to export any of the plants. The fruits are covered by a sweetish, but very astringent pulp, the nuts are bitter and emetic in their natural state; but are edible when cooked. The stem exudes a whitish, transparent gum, resembling tragacanth. Captain D'Urville states that the terminal shoot is poi-

sonous, and that two of his crew suffered from eating it in New Guinea. *C. revoluta* also affords a kind of Sago, of secondary quality; which is used in the Molucca islands, &c. The stem, as in the last-mentioned species, furnishes a clear gum. *C. inermis* has much the same properties.

Fig. 265.



C. revoluta.

The roots of several species of *Zamia*, as *Z. integrifolia*, *media*, *angustifolia*, *pumila*, *furfuracea*, &c., also abound in a fecula resembling the best Arrow-root. Dr. Lindley states one of the best varieties of this substance prepared in the Bahamas is from one of these species. What is termed "Florida Arrow Root" is obtained from the first two and perhaps from others. They have large, somewhat spherical roots, which are succulent and fleshy, abounding in a gummy juice. They were much used by the aborigines, by whom they were called Tuckahoe. They now are known under the name of Coonti, and when properly treated afford an excellent fecula, having all the qualities of the best Bermuda Arrow Root. (Carson in *Pereira*, ii. 169.) The fruit has a coating of an orange-coloured pulp, which Rafinesque states forms a rich edible food.

The large seeds of *Dion edule* are said to furnish a fecula much esteemed as food in Mexico. At the Cape of Good Hope various species of *Encephalartos* are employed by the natives as food, and are known under the name of Caffre bread.

Order 103.—PINACEÆ.—*Lindley.*

Flowers monœcious or diœcious, usually amentaceous. Sterile flowers: consisting of 1 or more (often monadelphous) stamens, with neither calyx nor corolla, arranged in a deciduous catkin around a common rachis; anthers 2 or many-lobed, with a longitudinal dehiscence. Fertile: in cones. Ovary merely a flat scale, without style or stigma, in the axil of a membranous bract. Ovule naked; in pairs or several on the face of the scale, inverted. Fruit varying in the different tribes.

These are trees or evergreen shrubs, with a branched trunk, abounding in a resinous juice. Wood with the tissue marked with circular disks. Leaves linear, acerose or lanceolate, entire, scattered, or fascicled. They are found in all parts of the world, but are most abundant in temperate regions. It is one of the most important orders, both on account of its wood and its resinous secretions.

Tribe 1. Abietinæ.—Fertile aments formed of imbricated scales, having a pair of ovules at base, with the foramen turned downwards. Sterile flowers with the pollen oval-curved. Fruit a strobile. Integument of seed coriaceous and woody; more or less adherent to the scale. Embryo in the axis of fleshy and oily albumen, with 2—15 cotyledons.

This is by far the most useful of the tribes, as it contains the greater number of the species affording the useful woods and resins.

Pinus.—*Linn.*

Flowers monœcious. Sterile flowers: catkins racemose; stamens short; anthers crested, 2-celled, with a longitudinal dehiscence (sometimes 1-celled). Fertile: catkins solitary, or from 2—3. Scales imbricated, with membranous bracteoles. Ovules 2, at the base of the scales, collateral, inverted, their points lacerated and turned downwards. Scales of strobile hard, woody, and truncated, hollowed at base for the reception of the seeds. Seeds prolonged into a membranous wing.

Mostly tall resiniferous trees, with verticillated branches, furnished with evergreen, fascicled leaves, surrounded at base with a membranous sheath. The species are very numerous, and all afford turpentine and resin; but the principal portion of these products is obtained from the following:

1. P. palustris, *Willdenow.*—Leaves in threes, very long; sheaths pinnatifid, scaly, persistent. Strobiles sub-cylindrical, armed with prickles.

Willdenow, *Sp. Pl.* iv. 499; Nuttall, *Gen.* 223; *P. australis*, Michaux, *N. A. Syl.* iii. 133.

Common Names.—Yellow Pine; Pitch Pine; Long-leaved Pine.

A very large tree, indigenous to the southern portions of the United States. This species furnishes the greatest proportion of Turpentine obtained in this country.

2. P. tæda, *Willdenow.*—Leaves in threes, elongated; sheaths elongated; strobiles oblong-conical, deflexed, shorter than the leaves; spines inflexed.

Willdenow, *Sp. Pl.* iv. 498; Michaux, *N. A. Syl.* iii. 156; Nuttall, *Gen.* 223.

Common Names.—Loblolly Pine; Old-field Pine.

This is also a tall tree, and is abundant to the southward. It yields much Turpentine, but not as fluid as that from the preceding species.

3. P. rigida, *Michaux.*—Leaves in threes; sheath short; strobiles ovate, scattered or clustered; spines of the scales reflexed.

Common Names.—Black Pine; Pitch Pine.

Fig. 266.

P. sylvestris.

This is a tolerably large tree, found in many parts of the United States; it also produces much Turpentine, and is one of the species used for the extraction of Tar.

4. P. sylvestris, *Linn.*—Leaves in pairs. Sheaths spirally disposed, lacerated. Strobiles ovate-conical, about as long as the leaves. Scales tessellated, unarmed.

Linn., *Sp. Pl.* 1418; Lambert, *Pin.* t. 1; Loudon, *Arboret.* 2153.

Common Names.—Scotch Fir; Red Deal, &c.

A native of sandy hills and woods in Europe, north of the Alps. It yields the larger part of "European Common Turpentine."

5. P. pumilis, *Willdenow.*—Leaves in pairs, short, straight. Strobiles ovate, obtuse, very small.

Willdenow, *Sp. Pl.* iv. 495; Lambert, *Pin.* t. 2; Loudon, *Arboret*, 2186; Lindley, *Flor. Med.* 553.

A small tree, occurring on the mountains in the southeast parts of Europe. This species furnishes what is called "Hungarian Balsam."

6. P. PINASTER, *Aiton.*—Leaves in pairs, long. Strobiles clustered, large, ovate, sessile. Scales with a short spine.

Aiton, *Hort. Kew.* iii. 367; Lambert, *Pin.* t. 4—5; Loudon, *Arboret.* 2213; Lindley, *Fl. Med.* 554.

Common Names.—Pinaster; Cluster Pine.

Fig. 267.

P. pinea.

A native of the southern parts of Europe, especially in the sandy plains north of the Mediterranean. Furnishes the "Bordeaux Turpentine."

Numerous other species afford analogous products; thus, *P. cembra*, of the mountains of Europe, yields "Carpathian Balsam," as does also *P. pinea*. The seeds of some are eatable, especially those of *P. pinea*, *P. cembra*, of Europe, and *P. lambertiana* and *P. gerardiana*.

ABIES.—*Tournefort.*

Characters the same as those of Pinus, except that the leaves are solitary and distinct at base, and the scales of the cone even and attenuated, and usually coriaceous and membranous.

They are also large trees, found in northern Europe and America, and usually yield a very pure turpentine.

Fig. 268.

A. balsamea.

1. A. BALSAMEA, *Marshall.*—Leaves solitary, flat, emarginate or entire, glaucous beneath, somewhat pectinate, recurved, spreading. Strobiles cylindrical, erect. Bracts short, obovate, pointed, sub-serrulate.

Marshall, *Arbust. Am.* 102; Lindley, *Fl. Med.* 554; *A. balsamifera*, Mich. *Arb. Forest.* iii. 191; *Pinus balsamea*, Linn., *Sp. Pl.* 1421; Willdenow, *Sp. Pl.* iv. 504; Lambert, *Pin.* t. 35; *Picea balsamea*, Loudon, *Arboret.* 2339.

Common Name.—Balm of Gilead.

A beautiful tree, of moderate size, peculiar to the northern parts of this continent, and also found on the mountain ranges further south. It yields "Canada Balsam."

2. A. PICEA, *Lindley*.—Leaves numerous, linear, acute or emarginate, spreading, glaucous beneath. Strobiles long, cylindrical. Bracts much narrower than the scales of the strobiles, with a long, subulate point.

Lindley, *Pen. Cyclop.* i. 29, *Fl. Med.* 554; *A. pectinata*, De Candolle, *Fl. Fr.* ii. 275; *Pinus picea*, Linn., *Sp. Pl.* 1420; Lambert, *Pin.* t. 30; *Picea pectinata*, Loudon, *Arboret.* 2339.

Common Names.—Silver Pine; Silver Fir.

A native of the mountains of the middle and south of Europe. It affords the "Strasburgh turpentine."

3. A. CANADENSIS, *Michaux*.—Leaves solitary, flat, serrulated, somewhat distichous. Strobiles ovate, terminal, scarcely longer than the leaf.

Michaux, *N. A. Syl.* iii. 185; *Pinus canadensis*, Willdenow, *Sp. Pl.* iv. 505; Barton, *Flor. Phil. Prod.* ii.; Lambert, *Pin.* t. 45; Lindley, *Pen. Cyclop.* i. 30.

Common Name.—Hemlock Spruce.

Fig. 269.

A. excelsa.

Abundant in the Northern, and in elevated situations in the Middle States. It is a very large tree, and affords the "Hemlock gum or pitch." The bark is astringent, and used in tanning.

4. A. EXCELSA, *De Candolle*.—Leaves scattered, somewhat 4-cornered, mucronate. Strobiles cylindrical, pendulous, with blunt, undulated, slightly-toothed scales.

De Candolle, *Fl. Franc.* iii. 375; Lindley, *Pen. Cyclop.* i. 31; *Pinus abies*, Linn., *Sp. Pl.* 1421; Willdenow, *Sp. Pl.* iv. 506; Stephenson and Churchill, ii. 75.

Common Names.—Norway Pine; Norway Spruce Fir.

One of the largest of the European trees; it is found in various parts of Europe and northern Asia. It yields some of the "Burgundy Pitch" of the shops. This product is also obtained from *A. picea*.

5. A. NIGRA, *Michaux*.—Leaves spreading equally round the branch, short, quadrangular. Strobiles ovate-oblong, obtuse, with ragged, rounded scales.

Michaux, *Arb. Forest.* i. t. 11; Lindley, *Pen. Cyclop.* i. 32; *Pinus nigra* and *rubra*, Lambert, *Pin.* t. 37, 38; *P. denticulata*, Michaux, *Fl. Bor. Am.*

Common Names.—Black Spruce; Double Spruce.

A large tree, found in the most northern parts of this continent, and extend-

ing in elevated situations to the Middle States. From the young branches the "Extract or Essence of Spruce" is made, from which, or from the fresh leaves and branches, Spruce beer is prepared.

6. A. LARIX, *Richard.*—Leaves scattered, deciduous. Cones ovate-oblong, blunt.

Richard, *Monog. Con.* 164, t. 13; Lindley, *Pen. Cyclop.* i. 32; *Pinus larix*, Linn., *Sp. Pl.* 1420; Lambert, *Pin.* t. 35; *Larix europæa*, De Candolle, *Fl. Franc.* 2064; Loudon, *Arboret.* 2350.

Common Names.—Larch; Common Larch.

A native of mountainous regions in the north and middle of Europe. It furnishes "Venice Turpentine," and a peculiar saccharine substance exudes from the branches, called "Manna of Briançon." When larch forests take fire, a gum issues from the trees during their combustion, which is termed "Gum Orenberg;" this is wholly soluble in water. The bark is used in tanning.

The turpentines are all stimulating, diuretic, anthelmintic, and in large doses purgative. At first they are liquid, but gradually lose their volatile oil by evaporation, and become hard, and form what is called Resin. By distillation, they afford Oil of Turpentine, and by a coarse kind of distillation, Pitch and Tar.

Oil of turpentine is employed for a variety of purposes in medicine. As a vermifuge, especially in cases of tapeworm, it is much relied upon; to do good in these cases, it must be administered in very large doses. It is also useful as a stimulant in the low stages of fever, and has been given with benefit in chronic rheumatism and obstructions of the bowels; it has also proved useful in chronic complaints of the urinary apparatus. In the form of enema, it has been successfully resorted to in colic, obstinate constipation, and ascarides. As an external irritant and revulsive, it is extensively employed, but should be used with caution, as it is so powerful as to produce great inflammation of the skin.

The different varieties of Resin are principally employed as ingredients in ointments and plasters, as are also those known as Burgundy Pitch and Hemlock Gum. The properties of Liquid Pitch or Tar are much the same as those of the Turpentines; it is mainly employed in the form of ointment in cutaneous affections. At one time Tar-water had an unbounded reputation in the treatment of almost every disease, being considered a universal panacea, but is now seldom used.

Numerous other trees of this tribe furnish important products. Thus, the Damarra Turpentine is obtained from *Damarra australis;* and the Dombeya Turpentine from *Dombeya excelsa*, a native of Chili. *Araucaria brasiliensis* yields a fragrant resin.

Tribe 2. CUPRESSEÆ.—Ovules erect; pollen spheroidal.

The secretions and properties of this tribe differ very materially from those of the last, and are by no means as identical among themselves.

JUNIPERUS.—*Linn.*

Flowers diœcious, rarely monœcious. Sterile: catkins axillary, or sub-terminal, globose, small. Fertile: catkins axillary, ovate imbricated, bracteate. Scales 3—6, united at base, and containing 1—3 ovules, which are erect, perforated at the apex and bottle-

shaped. Fruit consisting of succulent scales consolidated into a drupe-like body. Seeds triquetrous.

These are arborescent, shrubby, or suffruticose plants, with mostly alternate branches, furnished with opposite or verticillate leaves, which are imbricated or spreading, very acute or partly obtuse. They are natives of North America, Northern Asia, and Europe.

Fig. 270.

J. communis.

1. J. COMMUNIS, *Linn.*—A large shrub. Extremities of the branches smooth and angular. Leaves in threes, linear-acerose, sharply mucronate, shining green beneath, but with a glaucous line along the centre of the upper surface; they are resupinate, turning their upper surface to the ground. Barren flowers in small axillary aments, with roundish, stipitate scales enclosing the anthers. Fertile flowers on another plant, having a small 3-parted involucre, growing to the scales, which are 3. Fruit fleshy, berried, of a dark-purplish colour, formed of the confluent succulent scales, which are marked with three prominences or vesicles at top, and contain three seeds.

Linn., *Sp. Pl.* 1470; *Eng. Bot.* 1100; Bigelow, *Med. Bot.* iii. t. 44? Rafinesque, *Med. Fl.* ii. 12; Lindley, *Fl. Med.* 556; Loudon, *Arboret.* 2489.

Common Names.—Juniper; Common Juniper.

Foreign Names.—Genevier commun, *Fr.;* Ginepro, *It.;* Wachholderbaum, *Ger.*

The Juniper is found in North America, Europe, and Northern Asia. The berries are officinal, and are principally imported into this country from the Mediterranean ports. Some are collected in New Jersey and elsewhere, but are said not to be equal to the foreign. The plant figured and described by Dr. Bigelow as *J. communis*, is considered by some botanists to be a distinct species, and has been called *J. depressa*, but it does not appear to be more than a variety. The berries, as found in commerce, are oblong-globular, marked with three radiating furrows at the top, and below by the bracts. They are of a purplish-black colour, have a sweetish, somewhat terebinthinate taste, and a peculiar aromatic odour. These properties are owing to the presence of a Volatile oil, besides which they contain Wax, Resin, Gum, &c.

The great employment of these berries is in the manufacture of Gin. They are used in medicine as stimulating diuretics, especially in combination with Cremor tartar. They have likewise been prescribed with advantage in some affections of the genito-urinary apparatus, especially in mucous discharges from these parts. They are usually given in infusion, but the oil is one of the best modes of exhibition.

2. J. SABINA, *Linn.*—A small tree or shrub, usually more disposed to spread horizontally than to form a stem. Branches slender, round, tough, covered with short, acute, imbricating leaves, which are very bitter, and have an unpleasant odour. The fruit is deep bluish-black, about the size of a currant.

Linn., *Sp. Pl.* 1472; Woodville, t. 94; Lindley, *Fl. Med.* 557; Loudon, *Arboret.* 2499.

Common Names.—Savin; Common Savin.
Foreign Names.—Sabine, *Fr.*; Sabina, *It.*; Swenbaum, *Ger.*

An evergreen shrub indigenous to the South of Europe and Asiatic Russia. The tips of the branches and their investing leaves are officinal. These, when dried, have a bitter, acrid taste, and a strong disagreeable odour. These properties are owing to the presence of a Volatile oil, which can be obtained by distillation with water; this oil is limpid, almost colourless, and has the odour and taste of the plant.

Medical Uses.—Savin and its oil are powerful stimulants, and are supposed to have a special action on the uterus, and hence have been administered in amenorrhœa, and with some success, where there is no local or general excitement. It is also thought to be capable of inducing abortion in the pregnant female, and is one article resorted to for this purpose, too often at the expense of the mother's life, as in an over-dose it acts like an irritant poison. Dr. Chapman speaks of it with some praise in chronic rheumatism. It has also proved effectual as an anthelmintic.

It is principally employed in the form of cerate to keep a discharge from blistered surfaces. This cerate, mixed with verdigris, is a good application to venereal warts. The dose of the powder is from five to ten grains; of the oil from two to five drops.

3. J. VIRGINIANA, *Linn.*—A middle-sized tree, with a straight trunk and horizontal branches. The small twigs covered with small, densely imbricated leaves. These leaves are fleshy, concave, rigidly acute, with a minute gland on the middle of their outer side. Sterile flowers in small oblong aments, formed of peltate scales, concealing the anthers between them. Fertile flowers in a small roundish strobile or galbanus, with two or three seeds.

Linn., *Sp. Pl.* 1471; Bigelow, *Med. Bot.* iii. t. 45; Loudon, *Arboret.* 2495; Marshall, *Arbust. Am.* 70; Michaux, *N. A. Syl.* iii. 221.
Common Names.—Cedar-tree; Red Cedar.

The Red Cedar is a native of most parts of the United States, but attains the greatest size in the Southern States. It is well known for its durable and odoriferous heart-wood, of a reddish colour. The leaves are officinal; they very closely resemble those of *J. sabina*, but may be distinguished by their more agreeable odour.

Medical Uses.—The leaves have the same properties as Savin, but are less efficient, either as an internal remedy or external application. Small excrescences are often found on the small branches, produced like galls, by the puncture of an insect, and having a somewhat aromatic smell, and a bitterish taste; these are much employed in domestic practice as an anthelmintic, and have proved serviceable in many cases, but should not be relied upon to the exclusion of more certain and efficient articles.

Some other plants of this tribe afford useful products; thus Sandarach, a whitish-yellow, brittle, inflammable resin, of an acrid, aromatic taste, has been thought to be an exudation from *Juniperus communis*, but is shown by Brongniart and Shousboe, to be obtained from *Callitris quadrivalvis*, a native of Barbary. The wood is considered, by the Moors, to be indestructible, and is employed by them in the construction of their mosques. A somewhat similar substance is yielded by *Thuya*, but in very small quantities. The leaves of *T. occidentalis* or Arbor vitæ, are said to form an excellent irritating ointment, which has proved useful in rheumatism, &c. A decoction of the leaves has been popularly used in a variety of complaints, and the oil obtained from them by distillation has been noticed as a good vermifuge. The leaves of

Cupressus sempervirens, are likewise said to be anthelmintic, and according to Pliny, an antidote to the venom of serpents. Galen states that the strobiles are an efficacious astringent in diseases of the bowels, and are also useful as a febrifuge. An infusion of our native *C. thyoides*, or White Cedar, is stated to be stomachic, and in a warm state, diaphoretic. The cones of *Schubertia disticha*, or American Cypress, are very balsamic, and the resin from them has been employed in domestic practice as a diuretic and carminative.

Tribe 3. TAXINEÆ.—Fertile flowers solitary, terminal, consisting of an ovule, mostly surrounded by a fleshy disk; in fruit forming a kind of drupe.

This tribe has been separated, by some botanists, from Pinaceæ, on account of the structure of its fruit; but if this is considered a valid ground, the Junipers should also constitute an order. Most of the species are resinous, and their wood is very durable. *Taxus baccata*, the Yew, has fetid leaves, which are said to be poisonous, especially to cattle. The ancients entertained an idea that the emanations from the tree were extremely dangerous, especially during the flowering season, and that the juice of the plant was a virulent poison. More modern observations have shown, that although the leaves, are capable of destroying life, they cannot be considered as among the active poisons. According to Burnett, on the authority of an Italian physician, these leaves, in small doses, act in the manner of Digitalis, in reducing the force of the circulation, and have one advantage over that drug, of never accumulating in the system. The fruit of *Caryotaxus nucifera* are astringent, and are said to be employed in Japan to restrain the emission of urine; those of *Salisburia* are edible, and much esteemed in the same country as promoters of digestion. The young branches of *Dacydium taxifolium* are used in New Zealand to prepare a beverage analogous to Spruce Beer.

Class III.—Endogens or Monocotyledonous Plants.

Stem without distinct bark or pith; the wood formed of bundles of fibres and vessels irregularly dispersed through cellular tissue; the epidermis or rind closely adherent; no medullary rays or concentric layers; increase in size by the deposition of new fibres in the central part of the stem, within the old. Leaves seldom articulated, usually sheathing at base, with simple, parallel veins. Embryo with a single cotyledon, or if a second be present, it is much smaller than the other. Germination endorhizal.

Fig. 271.

q. Transverse section of an endogenous stem. *u*. Stem and leaves, showing the parallel veins. *r*. Germinating seed. *s*. Section of germinating seed. *t*. Germinating seeds of a grass with 2 unequal cotyledons.

Group XLII.—Palmales.

Order 104.—PALMACEÆ.—*Lindley.*

Flowers monœcious, supported by scaly bracts. Sepals 3, colourless, fleshy or leathery, persistent. Petals 3, sometimes very connate. Stamens inserted on the base of the petals, usually definite, opposite the segments, sometimes indefinite. Ovary free, usually of 3 carpels, wholly united, or partially so, sometimes of 1 or 2 only. Ovules solitary, rarely 2, erect, orthotropal, or anatropal. Styles continuous with the carpels. Fruit drupaceous or nut-like, or berried, often with a fibrous rind. Seed filling the cavity, often reticulated. Albumen cartilaginous, often ruminated, frequently with a central cavity. Embryo in a particular cavity of the albumen.

Plants with arborescent, simple stems, sometimes shrubby, occasionally branched, with clustered, terminal, usually very large, pinnate, or flabelliform leaves, with simple, parallel veins. They are all natives of warm climates. They are very numerous, Martius estimating the known species at upwards of a thousand. Their products are various: these being, according to Humboldt, wine, wax, oil, flour, sugar, and salt, and their wood and leaves are applied to numerous purposes.

They have been divided into several tribes, some of which seem to be entitled to a higher rank.

Tribe 1. Arecæ.

Areca.—*Linn.*

Flowers monœcious. Sterile: calyx 3-parted, corolla 3-petalled. Fertile: calyx 3-leaved. Corolla 3-petalled. Nectary 6-toothed. Ovary superior, 1-celled, 1-seeded. Drupe coriaceous, containing a single seed, with a ruminated albumen, with the embryo at the base.

Linn., *Sp. Pl.* 1225; Roxburgh, *Cor. Pl.* 75; Ainslie, *Mat. Ind.* ii. 268.

A small genus, bearing a kind of nut much used in the East Indies, where it is known as the Betel-nut.

A. catechu, *Linn.*—Trunk straight and slender, from 40 to 50 feet high. Fronds pinnate; leaflets compound, linear, opposite, præmorse. Spathe erect, ramose. Male flowers hexandrous. Seed of a roundish, conic form, and obtuse.

Common Names.—Betel-nut tree; Pinang tree.

It grows in most parts of the East Indies, and was known from the earliest times. The Greeks and Romans do not appear to have been acquainted with it, but the ancient Arabian writers speak of the nut frequently in their works, under the name of *Foofel*, and considered it as astringent and tonic. This fruit is about the size, and somewhat the shape of a small egg, the nut itself is rather larger than a nutmeg, roundish-conical, flattened at base, hard, corneous, externally reddish-brown, and internally brown, with white veins; it is inodorous, and of an astringent, somewhat acrid taste. It contains Tannin, Gallic acid, Oil, Gum, &c.

They furnish an astringent extract, which constitutes one or more varieties of the Catechu of commerce. According to Dr. Heyne, the nuts are boiled for some hours in an iron vessel. They are then removed, and the fluid inspissated by continuing the heat; this affords the second quality. After the nuts are dried, they are again boiled in another portion of water, which, on being evaporated, gives the first and dearest kind. These extracts have the same properties as those from the *Acacia*, *Nauclea*, &c. (*q. v.*)

But the great consumption of the Betel-nut is for chewing in combination with the leaf of the *Chavica betle* and lime. For this purpose they are divided into quarters, one of which, rolled in the Pepper-leaf and sprinkled with the lime, forms the quantity generally used. This mixture acts as a sialagogue, and tinges the saliva of a red colour. The natives of the East Indies say that it strengthens the gums, fastens the teeth, and cools the mouth. It also seems to have some narcotic power, but Dr. Lindley suggests that this is owing rather to the Pepper-leaf than to the Areca. Lunan (*Hort. Jam.* i. 86) states that it is used in the West Indies, and it is there supposed, that when thus used in combination it strengthens the stomach, but if employed alone, it impoverishes the blood and causes jaundice. It is probable that the nut he alludes to is the product of another species, the *A. oleracea*, or Cabbage Palm. Loureiro, also, notices another species, *A. sylvestris*, which is used in Cochin China.

The *Arenga saccharifera* (*Saguerus Rumphii*) is another very important species belonging to this tribe. It abounds in the islands of the Indian Archipelago, and is very valuable on account of its saccharine juice. This flows from the spadices in large quantities, if they are wounded; and if suffered to ferment, forms an intoxicating liquor, and when boiled affords a kind of sugar, which is much used for various purposes. The pith of the trunk also furnishes Sago of good quality; as much as one hundred and fifty to two hundred pounds from a single tree. The wood is very hard, and is employed for building; and the leaf-stalks afford a black, strong fibre, resembling horse-hair, which is extensively manufactured into ropes, &c. The fruit is excessively acrid, and causes severe inflammation of the mouth if it be eaten; and forms the basis of the "infernal water" used by the Moluccans to pour over their enemies; the albumen, however, is made by the Chinese into a pleasant sweetmeat, by destroying the acridity by soaking it in lime-water and then boiling it in sugar.

According to Roxburgh, *Caryota urens* is equally valuable to the natives of the places where it grows. It yields, during the hot season, great quantities of juice, which, when fermented, forms what is called Toddy or Palm Wine. It is said a good tree will afford one hundred pints in the twenty-four hours. The pith furnishes a very superior Sago, which forms the principal part of the food of the inhabitants; Roxburgh states that it is fully equal to that from the *Sagus*. The fruit is extremely acrid.

Tribe 2. CALAMEÆ.

SAGUS.—*Gærtner.*

Flowers monœcious. Sterile: calyx 5-toothed. Petals 3. Stamens 6—12, with distinct, compressed filaments. Fertile: calyx 3-toothed. Corolla campanulate, 3-fid. Cup of stamens 6-toothed, with abortive, sagittate anthers. Ovary 3-celled. Stigmas 3, subulate, connate. Fruit 1-seeded, coated with reversed scales. Albumen ruminated. Embryo dorsal, on an umbilical pit.

Several species of this genus are interesting from the large quantities of Sago afforded from their pith, but there is some difference of opinion from which of them the commercial article is obtained. Dr. Roxburgh states that it is from *S. inermis* (*lævis*, Jack.), and this is the species noticed by Lindley. Blume says it is from this and *S. gemina*. The London and U. S. Pharmacopœias give *S. Rumphii* as the officinal species, but it is probable that it is in part derived from each of them, and also from the *Arenga saccharifera*, and several others of the Palmaceæ.

Sago was not known to the ancients; the first notice of it, according to Pereira, is by Lopez (*Hist. dell. Ind. Oc.* 1578). It appears to have been very early used in the East Indies, where it constitutes a large proportion of the food of the natives in certain places. It is usually obtained by cutting the stem of the tree into convenient lengths, splitting these longitudinally so as to form a kind of trough, in which the soft internal portion is stirred and mixed till the fecula becomes suspended, when the mixture is drawn off, through a sieve, and the amylaceous matter suffered to subside; when dried, this precipitate resembles a yellowish-white arrow-root, and forms what is called meal Sago (Fig. 46). To form the Granular Sago, the former is made into a paste with water, and granulated in drying. There are several varieties, of which the most esteemed is the Pearl Sago, which is of a whiter colour, and in smaller grains than the common kind. It is stated that a single tree will furnish from five hundred to six hundred pounds of the farina.

Fig. 272.

S. Rumphii.

a. Tree. *b.* Young, &c. *c.* Fertile spadix. *d.* Ripe fruit.

Sago is insoluble in cold water, but by boiling becomes soft, and at last forms a gelatinous solution. It is nutritive and easy of digestion, and therefore constitutes an excellent article of diet for the invalid and convalescent.

The *Borassus flabelliformis* is said by Ainslie to be one of the most useful trees in India. The juice, like that of the *Arenga* and *Cocos*, is called Toddy, and when fresh is a sweet and pleasant-tasted liquid, which is considered cooling and aperient, and is much used as a preventive of constipation. When kept for some hours, fermentation takes place, and it is transformed into an intoxicating liquor, known as Palm Wine. *Hyphæne thebaica* is called the Gingerbread Tree, from the resemblance of the brown, mealy rind of its fruit to that kind of cake. It is more generally, however, known as the Doum Palm. It is an inhabitant of Upper Egypt, where the spongy internal portion of its fruit forms an important article of food. When this pulp is mixed with an infusion of Dates, it constitutes a cooling drink, much prescribed among the Arabs in febrile affections, as cooling and demulcent. (Sonnini, *Voyage*, iii. 15.) *Zalacca edulis* is a small species, the seeds of which have a pulpy covering, much esteemed by the Burmese. *Raphia vinifera* and *Mauritea vinifera*, as their names indicate, afford Toddy and Palm Wine.

Tribe 4. CORYPHEÆ.

The leaves of *Corypha gebanga* are used in Java for a variety of purposes, being woven into hats, ropes, &c., and their fibres into a kind of cloth. The stem furnishes an inferior sort of Sago. The root is slightly astringent and emollient, and is used in bowel complaints (Blume, *Rumphia*, ii. 60.) This tribe contains the most important of the Palms; this is the Date Tree, *Phœnix dactylifera*, the fruit of which forms so essential an article of sustenance in some parts of the world. It has been known and prized from the earliest antiquity. The fruit is very nourishing and wholesome, and grows

in bunches weighing from twenty to twenty-five pounds. Every part of the tree is useful; the wood is very hard, and is employed in building; the leaves are manufactured into a variety of articles; the juice forms one of the kinds of Palm Wine, and the seeds are ground to make oil. Another species, *P. sylvestris*, yields much sugar, and Dr. Roxburgh estimates that 100,000 cwts. are made from it annually in Bengal. *P. farinifera* affords a good Sago. The roots of *Chamærops palmetto*, of the Southern States, is said to contain much tannin, and the leaves are employed in the manufacture of hats, &c. The juice, when fermented, makes a palatable Palm Wine.

Tribe 5. Cocoeæ.

Fig. 273.

C. nucifera.

The most remarkable and best known of the Palms, the *Cocos nucifera*, belongs to this group. Every portion of this tree is converted to some use. "The root is sometimes masticated instead of Betel-nut; of the small fibres baskets are made in Brazil. The hard case of the stem is converted into drums, and used in the construction of huts; the lower part is so hard as to take a beautiful polish, when it resembles agate; the reticulated substance at the base of the leaves is formed into cradles, and into a coarse kind of cloth. The unexpanded terminal bud is a delicate article of food; the leaves furnish thatch for dwellings, and materials for fences, buckets, and baskets; they are used for writing upon, and make excellent torches; potash in abundance is yielded by their ashes; the midrib of the leaf serves for oars; the juice of the flower and stems is replete with sugar, and is fermented into excellent wine, or distilled into a sort of spirit called Arrack; or the sugar is separated, under the name of Jagary. The value of the fruit for food, and the delicious beverage it contains, are well known. The fibrous and uneatable rind is not less useful; it is not only used to polish furniture and scour floors, but is manufactured into a kind of cordage called Coir Rope, which is nearly equal in strength to hemp, and is designated by Roxburgh as the very best of all materials for cables, on account

of its great elasticity and strength. Finally, an excellent oil is obtained from the kernels by expression." (Lindley, *Veg. King.* 136.)

But most of the Palm oil of commerce is the product of *Elais guineensis* and *E. melanococca*, but is also yielded by several other species of Palmaceæ. This semi-concrete oil is principally imported into this country from Africa, but is also prepared in various parts of tropical America, and in the South Sea Islands. It is of about the consistence of soft butter, of an orange-red colour, a pleasant odour, and a sweetish taste. It is mainly employed in the manufacture of soaps, but has been used in medicine as the basis of several embrocations and ointments.

Fig. 274.

E. guineensis.

Some of the Palms furnish a kind of wax; thus the *Ceroxylon andicola*, or Wax Palm, has a coating of wax on its stem, which has exuded from the spaces between the insertion of the leaves. This substance, according to Vauquelin (*Ann. Chim.* xxix. 330), is composed of two parts resin, and one of wax. M. Bonastre is of opinion that it contains a peculiar principle, which he calls *Ceroxylin*. A curious product of one of these trees is the Vegetable Ivory; this is the fruit of the *Phytelephas macrocarpa*. Ruiz and Pavon state that this fruit at first contains a clear, insipid fluid, which is potable like that of the Cocoa-nut, but by degrees it becomes milky, and at last acquires a solidity almost equal to that of ivory. From these hardened kernels various toys are made which closely resemble ivory in texture and appearance.

Several species of *Calamus* afford a red, resinous substance, known as Dragon's-blood; more especially *C. draco*, a native of the Indian Archipelago. There are several kinds of this Resin, which will be more particularly noticed in another place.

Fig. 275.

C. andicola.

Group XLIII.—Arales.

Order 105.—ARACEÆ.—*Schott.*

Flowers monœcious, naked, arranged upon the surface of a spadix, within a spathe. Sterile flowers: stamens definite or indefinite, hypogynous, short; anthers 1—2, many-celled, ovate, extrorse. Fertile at the lower part of the spadix. Ovary free, 1-celled, seldom 3-, many-celled, many-ovuled; ovules erect or parietal, sessile, or attached to long cords, orthotropal, campylotropal, or occasionally anatropal; stigma sessile. Fruit succulent. Seeds pulpy; embryo in the axis of fleshy or mealy albumen, straight, with a cleft on one side for the plumule.

The species are herbaceous, or shrubs; often with fleshy corms, stemless, or arborescent, or climbing by aerial roots. Leaves sheathing at base, convolute in vernation, sometimes compound, often cordate. They are principally natives of tropical climates, but a few occur in temperate regions; in the former they are arborescent or shrubby, whilst in cold and temperate countries they are small and herbaceous. They are in almost all cases acrid, and in some species so much so as to render them dangerous poisons. Sir Wm. Hooker (*Exot. Flor.* 1) states that *Dieffenbachia seguina*, or Dumb-cane, is one of the most venomous of all known plants; if the rhizome be chewed, it causes a dangerous swelling of the tongue, destroying all power of speech, and that even the slightest application of the juice of the spadix to the lips gives great pain. Browne (*Hist. Jam.*) says that the stem is used in the West Indies to produce granulation in sugar. In other species, again, this acridity is so much diminished that the roots and leaves are used as food, when properly cooked. The order has been divided into several tribes.

1. Cryptocorynæ.—Stamens distinct from pistils, which are several, grouped round the base of the spadix in a many-celled ovary.

The species of this tribe do not appear to possess any striking qualities, and are little known.

2. Dracunculæ.—Stamens and pistils numerous, with rudimentary organs interspersed. Spadix naked at the end. Cells of anthers larger than the connectivum.

Almost all the plants of this tribe are acrid, but afford a fecula from their cormus that is edible when deprived of the volatile principle. Thus, those of *Arum maculatum*, when grated, and repeatedly washed, and subjected to the action of heat, furnish a bland and nutritious amylaceous powder which is known in England as Portland arrow-root, from being principally manufactured in that place. *A. indicum* is much cultivated in some parts of India for its succulent stems and small tubers.

Fig. 276.

A. triphylla.

The tubers of *Amorphophallus trilobatum*, of the East Indies, are very acrid, and are used in cataplasms to maturate malignant tumours, and are also applied in the bites of venomous snakes; at the same time a small portion is taken internally (*Roxburgh*). The large corms of other species of the Indian Archipelago afford an edible, starchy substance.

Ariscæma triphylla is recognised as officinal in the United States Pharmacopœia,

under the name of *Arum*. It is indigenous to most parts of the United States, growing in damp, shady situations, and is known by the names of Indian Turnip, Dragon Root, &c. Every part of the plant is acrid, but more especially the corm, which leaves a burning, caustic sensation in the mouth on being chewed. As in most of the tribe, the acrid principle is volatile, and destructible by heat or drying. The fecula of the dried corm is a pure and excellent arrow-root. In the recent or partially dried state it has been used as a carminative stimulant, in flatulence, colic, &c., and has also been thought beneficial in chronic bronchitis, in a case of which Dr. Carson states that he found it of service (*Pereira*, ii. 86). It has been employed in aphthous sore mouth, in rheumatic pains, &c.

Tribe 3. CALADICEÆ.—Stamens and pistils numerous, contiguous or separated by rudimentary bodies. Spadix usually naked at point. Cells of anthers with a thick connectivum.

Fig. 277.

C. antiquorum.

Caladium bicolor is said to be cathartic and anthelmintic in a fresh state; but the corm is esculent when cooked, as are also those of *Xanthosoma sagittifolia*, and of *Peltandra virginica;* but both are too acrid to be employed in a recent state. Various species of *Phyllodendron* have a turbid, acrid juice, which is used in Brazil to cleanse foul ulcers. They are also employed for many other purposes by the natives. The species of *Colocasia* are much less imbued with this acrid principle, and in most of them simple coction is sufficient to render their corms edible and healthy food. Thus in the East and West Indies, and in our Southern States, *C. esculenta*, *antiquorum*, *mucronata*, &c., are a common garden vegetable under the names of Cocos, Eddocs, &c. In the Himalayas, *C. himalensis* forms the principal sustenance of the inhabitants. In its recent state the root is stimulant, diaphoretic, and expectorant. In the South Sea Islands, *C. macrorhiza* is known by the name of Tara or Kupah, and is a main article of diet.

Tribe 4. ANAPOREÆ.—Stamens and pistils numerous, contiguous, usually with rudimentary bodies intermixed. Point of spadix seldom naked. Cells of anthers immersed in the thick, fleshy connectivum.

Little is known of the properties of most of the species of this tribe, though it is probable they are very active. The virulent nature of *Dieffenbachia* has already been noticed. In *Homalomena aromatica* the acridity is modified by the presence of an aromatic principle, which renders the odour of the rhizome very pleasant, somewhat resembling that of Ginger. It is highly prized in India for its stimulating medicinal virtues, and commands a high price.

Group XLIV.—Alismales.

ORDER 106.—ALISMACEÆ.—*Lindley.*

Sepals 3, herbaceous. Petals 3. Stamens definite or indefinite. Anthers introrse. Ovaries several, superior, 1-celled. Ovules erect or ascending, solitary or 2, attached to the suture, distant from each other, anatropal or campylotropal. Styles and stigmas as many as ovaries. Fruit dry, 1—2-seeded. Seeds exalbuminous, hooked. Embryo of a horse-shoe shape, undivided.

Aquatic or semi-aquatic plants, with creeping, fleshy, perennial rhizomes, and either narrow and ligulate leaves, or expanded into a broad lamina, with parallel veins. They chiefly occur in the northern hemisphere; some few, however, are found in the tropics. Most of them have fleshy rhizomes, which are wholesome and nutritious, especially those of several species of *Sagittaria*. In China the *S. sinensis* is much cultivated for its farinaceous tubers, which are found in the soil beneath the mud by which the plant is surrounded. They are sometimes several inches in diameter, and furnish no inconsiderable part of the food of the inhabitants. Even in a raw state they are a wholesome article of diet, and when properly prepared afford a white and light fecula, resembling arrow-root. Those of *S. sagittifolia* are much employed as food among our aboriginal tribes; and it is said that the leaves applied to the breasts of nursing females will tend to dispel the milk. Various of the Brazilian species are stated by Martius to be astringent, and their expressed juice to be used in the preparation of ink (*Mat. Med. Bras.* 47).

Fig. 278.

A. plantago.

The *Alisma plantago*, or Water Plantain, a native both of Europe and the United States, was known to the ancients, being spoken of by Dioscorides as a remedy in poisoning from Opium. It is somewhat allied to the *Ranunculaceæ* in its properties, as it is so acrid that it will vesicate, when it is applied in a bruised state to the skin; yet Haller recommends it in hæmorrhoids, and the Kalmucks use the roots as food. It is considered in Russia to be an antidote in hydrophobia. Martius states that the powdered state is administered in large doses, and that he has seen its good effects in upwards of a hundred cases (*Bull. Sci. Nat.*, 1828). This antilyssic property of the plant is also noticed by Leroshin, Burdach, and others (Fée, *Hist. Nat. Pharm.* i. 311). But trials made with it, in France and elsewhere, have proved its complete inefficiency in this disease, as might have been reasonably expected. De Haen is of opinion that the leaves are as beneficial as the *Uva Ursi* in complaints of the urinary organs, and they have been given by other practitioners with some success in these diseases.

Group XLV.—Juncales.

Order 107.—ORONTIACEÆ.—*Brown.*

Flowers bisexual on a simple spadix, having a white or coloured spathe. Calyx and corolla wanting, or consisting of 4—8 scales. Stamens as many as scales, hypogynous or perigynous; anthers 2-celled, with a longitudinal or transverse dehiscence. Ovary few, with 1 or more cells; ovules erect, anatropal or campylotropal, or pendulous and orthotropal; stigma capitate, sessile, or furnished with a subulate style. Fruit a berry. Embryo slit on one side, in the axis of fleshy, or horny or mealy albumen. Albumen sometimes wanting.

Herbaceous plants with broad entire or deeply divided leaves, sometimes, however, ensiform and equitant. Some are stemless, others are parasitic, and some are aquatic. They principally are tropical, but many are found in more temperate regions, or even in cold climates. Their properties are various, but the most characteristic quality is acridity. They are divided into three tribes.

Tribe 1. Calleæ.—Flowers naked. Ovules erect.

Most of these are acrid in a fresh state; thus the leaves of *Monstera pertusa* are employed by the natives of Demerara as vesicatories and rubefacients in cases of dropsy. The rhizomes of *Calla palustris*, a native of the northern parts of Europe and North America, are very acrid and caustic, but according to Linnæus (*Fl. Lappon.*), by drying, grinding and washing, furnish a very palatable bread. In a fresh state it is said to be powerfully diaphoretic in small dosés. The fruit of *Scindapsis officinalis* is said by Roxburgh (*Fl. Ind.* i. 431), to be an article in much estimation in the Hindoo Materia Medica, and sold in dried transverse pieces under the name of "Guj-puppul."

Tribe 2. Orontiæ.—Flowers with a regular perianth. Leaves entire, palmate, or pinnate, ovules pendulous.

Several species of this group are endowed with considerable power. *Pothos cannæformis*, of Cumana, is said by Kunth to possess the delicate odour of Vanilla, and to be employed to aromatise tobacco by the natives (*Nov. Gen.* i. 76). *P. scandens* is used in India as a remedy in putrid fevers. *Dracontium polyphyllum* has a most fetid smell when in flower, capable of causing vertigo, nausea and vomiting; in Guiana the corm is considered an antidote to the bites of venomous snakes, and Ainslie states (*Med. Ind.* ii. 464), that it is deemed antispasmodic and valuable in asthma; in the Society Islands it is said to be used as an emmenagogue, and Martius speaks of it as a caustic. The seeds of our native *Orontium aquaticum* formed an article of food with the Indians, for although acrid when fresh, they become mild and nutritive by boiling; this is also the case with the roots.

Symplocarpus.—*Salisbury.*

Spathe cucullate. Spadix short, covered with tetrandrous floscules. Ovaries 1-celled, with a solitary ovule in each; stigma very small. Berries consolidated. Seeds exalbuminous.

S. fœtidus, *Nuttall.*—Tuber large, abrupt, with numerous verticillate, fleshy fibres. Leaves smooth, green, ovate-cordate, with large, glaucous, spatulate-linguiform bracts. Spathe ovoid, roundish, cucullate, obliquely acuminate, spotted and sometimes almost covered with purplish blotches. Spadix pedunculate, simple, almost spherical. Flowers tessellately imbricate, adnate. Calyx of 4 fleshy, cuneate, truncate sepals, at length becoming very thick. Petals none. Stamens 4, opposite the sepals; filaments subulate; anthers exserted, oblong, 2-celled. Ovary roundish, immersed; style 4-sided, tapering; stigma minute. Seeds naked, large, round, enclosed in the common receptacle. Embryo prominent, umbilicately attached to a large, solid perisperm.

Nuttall, *Gen.* i. 105; Barton, *Veg. Mat. Med.* i. 123, t. 10; Lindley, *Fl. Med.* 604; *Dracontium fœtidum*, Linn., *Sp. Pl.* 1372; *Pothos fœtida*, *Hort. Kew.* iii. 319; Michaux, *Fl. Bor. Am.* ii. 186; *Ictodes fœtidus*, Bigelow, *Med. Bot.*.ii. t. 24.

Common Names.—Skunk Cabbage; Polecat Weed, &c.

This is found in many places in the United States, growing in moist situations. It flowers very early in the season, at which time the leaves have not appeared, not being developed till the end of April, and gradually increasing in size, and at last attaining very large dimensions. The whole plant, especially when bruised, emits a very disagreeable alliaceous odour, resembling that of garlic and assafœtida combined, or as its vulgar name indicates, that of the Skunk.

The root is officinal in the U. S. Pharmacopœia. The roots as found in the shops consist of both caudex and fibres; the former of a dark brown colour externally, and white and amylaceous within; the fibres are of a lighter tint, much wrinkled, and are by no means as acrid as the tuber. The taste of the fresh root or leaves is very acrid; this depending in a great measure on a volatile principle, is much diminished by drying, and is entirely dissipated by heat. The seeds in an entire state have no odour, but when bruised give out the peculiar smell of the plant, and are extremely acrid. From an examination of the roots and seeds by Mr. Turner (*Amer. Jour. Pharm.* ii. 1), it appears that they contain Volatile fatty matter, Volatile oil, Fixed oil, Wax, Starch, &c. The seeds contain much of the fixed oil, yielding twenty per cent.

Medical Uses.—The root and seeds are stimulant, antispasmodic and narcotic. In large doses Dr. Bigelow states that they occasion nausea, vomiting, headache, vertigo and dimness of sight. Schoepf notices the plant as an expectorant, and useful in phthisical coughs (*Mat. Med. Am.* 133). Dr. Cutler attracted the attention of the profession to it, as a palliative in asthma, and it has been employed by other practitioners with some success in that disease, as well as in chronic catarrh, rheumatism, hysteria, &c. Dr. Thacher even speaks of it as useful in dropsy.

The leaves are often used in the country to dress blisters, where it is wished to keep up a discharge; when bruised they are also considered as a good application to ulcers and wounds; and their expressed juice is stated to have been beneficially employed in obstinate cutaneous diseases. The dose of the powdered root is from 10 to 20 grains, several times a day, gradually increasing the dose. It has also been given in infusion and syrup.

Tribe 3. Acoreæ.—Flowers with a regular perianth. Leaves ensiform, equitant Ovules pendulous.

Acorus.—*Linn.*

Spadix naked, and closely covered with flowers. Flowers surrounded with 6 scales. Ovaries 3-celled; with about 6 suspended ovules in each cell; stigmas 3-lobed. Capsule several-seeded.

A small genus, found in most parts of the world, the species of which so closely resemble each other, that they are probably merely varieties, caused by differences of climate.

A. calamus, *Linn.*—Rhizome thick, jointed, somewhat spongy, with long slender roots, aromatic. The joints are from half an inch to an inch in length, and are variously shaded with different tints of red and white. The leaves are radical, sheathing at base, of a reddish colour below, long, flat and ensiform. The scape is similar to the leaves, but is generally longer, and bears a spadix about its middle. This is solitary, oblique and cylindrical, tapering towards the obtuse extremities. The flowers are small, and arranged in a spiral form, of a greenish colour, with six equal truncated scales, enclosing six stamens, having thick filaments and bilobate anthers. The ovary is sessile, with a pointed stigma. The capsule is several-seeded.

Linn., *Sp. Pl.* 462; Pursh, *Fl. Am.* i. 235; *Eng. Bot.* 356; Beck, *Bot. Nor. and Mid. St.* 381; Barton, *Veg. Mat. Med.* ii. t. 30; Rafinesque, *Med. Flor.* i. 25; Griffith, *Jour. Phil. Coll. Phar.* v. 265, &c.

Common Names.— Calamus; Sweet Flag; Sweet Root, &c.

Foreign Names.— Acore odorant, *Fr.*; Calamo aromatico, *It.*; Kalmuswurzel, *Ger.*

Fig. 279.

A. calamus.

Calamus is found in most parts of the world, on the borders of small streams and ponds, and in wet meadows, swamps, &c. It flowers in this latitude about May or June. The part used is the rhizome; this, as found in the shops, is in somewhat flattened pieces, deprived of their epidermis, wrinkled, of a yellowish colour, having on one side numerous small circular spots. Internally, whitish or yellowish; of a light and spongy texture; having a strong and fragrant odour, and a warm, bitterish, aromatic taste. It yields its virtues to water, but more fully to alcohol. From an analysis by Tromsdorff (*Ann. Chim.* xvii.), it appears to contain Volatile oil, Resin, Extractive, &c. The oil is stated, by Thomson, (*Mat. Med.* i.,) to differ from the other volatile oils in not dissolving Iodine. It is lighter than water, of a pale yellow colour, and very odorous and pungent.

It was, for a long time, supposed that this root was the *Calamus aromaticus* of the old writers. From the descriptions of this latter by Theophrastus, Galen, Pliny, and others, it would appear, that it consisted of reddish, knotty stems and roots, which were brittle, filled with pith, viscous when chewed, and of a bitter astringent taste; and that the plant itself perfumed the air around the spots in which it grew. From these accounts, it is impossible, at the present day, to ascertain, with any certainty, to what plant they referred. At a very early period, after the revival of science, the Acorus was assumed to be the true species, and was substituted for it, in all the dis-

eases in which this had been recommended by more ancient authorities. Matthiolus, in his Commentaries on Dioscorides, whilst admitting that the true Calamus was unknown, gives a representation of what he supposed it would be found to be; and this imaginary species is admitted by Bauhin in his Pinax. Clusius was the first to figure the *A. calamus* as the plant of the ancients, in *Plant. Rar.*, lib. ii. 230; but in his *Aromaticum*, 124, he retracted this opinion, and considers it to have been one of the Apiaceæ; his plate, however, somewhat resembles a culm of one of the grasses. In 1640, Prosper Albinus, in *Plantæ Exoticæ*, gave the figure of a plant from Egypt, which, he thinks, resembles a *Lysimachia*, and Lemery, in his *Dict. des Drogues*, has adopted his opinion. Linnæus refers it to his *Andropogon nardus*, and, finally, Guibourt has endeavoured to show, that it is identical with *Gentiana* (Agathotes) *chirayta*. Merat and De Lens are inclined to believe, that it is the variety of *Acorus calamus* found on the Malabar coast, and figured by Rheede, (*Hort. Malabar.*, ii. 48,) under the name of *Vaembu*. Be this as it may, no Calamus now is known, except the roots of the plant under consideration.

Medical Uses.—Calamus is a stimulating tonic, which has been found very useful in flatulent colic, in atonic conditions of the stomach, and other deranged conditions of the gastric organs. Dr. Thomson says, from his own experience, that it is one of the best adjuvants to bark and quinine in intermittents, and that, even alone, it has been successfully used in these diseases. In India it is highly esteemed, and Ainslie informs us, that it is deemed so valuable in diseases of the stomach and bowels, that a penalty is incurred by any druggist who will not dispense it, at whatever time it may be demanded. The Arabians and Persians consider it to be powerfully aphrodisiac and carminative. The Turks make a confection of it, which is regarded as a preservative against contagion.

It may be given in powder, in doses of a scruple to a drachm, or in infusion. When prescribed in the flatulent colic of infants, it is best combined with magnesia.

Group XLVI.—Narcissales.

Order 108.—HÆMODORACEÆ.—*Brown.*

Flowers hermaphrodite. Perianth mostly more or less woolly, adherent; sepals and petals often undistinguishable and united into a tube. Stamens inserted on the tube, either 3, and opposite the petals, or 6; anthers dehiscing inwardly. Ovary with the cells 1—2—many-seeded, adherent, usually 3-celled, sometimes 1-celled, with a placenta at one point of the axis; style simple; stigma undivided; ovules amphitropal. Fruit covered with the withered perianth, capsular, valvular, seldom indehiscent. Seeds definite or indefinite, fixed by the base or peltate, winged or wrinkled, and angular. Embryo in cartilaginous albumen.

They are herbaceous plants, sometimes very large, with fibrous perennial roots, and permanent, ensiform, equitant leaves, mostly in two ranks. They occur in South America, Cape of Good Hope, Australia, and sparingly in the United States. Many of them have a red juice, and most of them are bitter and astringent. Some, as *Hæmodorum spicatum*, and *paniculatum*, and *Anigosanthus floridus*, have roots which are acrid when fresh, but when roasted are mild and nutritious, and are used for food by the natives of Australia. *Lachnanthes tinctoria* of the United States, has a reddish root, which is somewhat astringent and tonic. The only important medicinal plant is the *Aletris*.

ALETRIS.—*Linn.*

Perianth semi-inferior, tubular, with a 6-cleft, spreading limb, somewhat hexagonal, scabrous, and plaited externally. Stamens inserted on the base of the segments; filaments flat; anthers somewhat sagittate. Ovary 3-lobed, pyramidal; style formed of 3 connate bristles; stigma simple. Capsule pyramidal, opening in three directions at the apex. Seeds very small, striated, numerous.

A small North American genus, with radical leaves, disposed in a stellate form.

A. FARINOSA, *Linn.*—Root perennial, small, contorted. Radical leaves spreading on the ground like a star, sessile, lanceolate, entire, smooth, ribbed, of a pale green, or glaucous colour. Stem from 1—3 feet high, simple, erect, invested with remote scales, which sometimes expand into small subulate leaves. Spike slender, scattered, each flower with a short pedicel and a minute bract. Perianth white, oblong-campanulate, divided in the limb into 6 acute, spreading segments; outside mealy, rugose. Stamens 6, inserted near the mouth; ovary pyramidal, semi-inferior; style triangular, separable into 3. Capsule triangular, invested with the permanent perianth, 3-celled, 3-valved at top. Seeds numerous, minute.

Fig. 280.

A. farinosa.

Linn., *Sp. Pl.* 456; *Bot. Mag.* 1418; Bigelow, *Med. Bot.* iii. 50; Rafinesque, *Med. Flor.* i. 37.

Common Names.—Blazing Star; Ague Root; Star Root, &c.

Found in most parts of the United States, usually in dry sandy soils and barrens. It flowers in June and July. The root is intensely bitter, owing, probably, to a resinous principle, as it is taken up by alcohol, and the solution is rendered turbid by water. It is also slightly soluble in water. No analysis has been made of it.

Medical Uses.—In small doses, it acts as a tonic and stomachic, but in larger quantities, operates as an emetic and cathartic, and displays some narcotic properties. It has been employed, in domestic practice, in a variety of diseases, but has not attracted much attention from the profession, and its real qualities are but little understood. The dose of the powder, as a tonic, is about 10 grains. Pursh states, that it is esteemed an excellent remedy in colic, and Dr. Cutler observes, that it has proved useful in chronic rheumatism, and Dr. Thacher says, that it has been employed with benefit in dropsical affections. In some curious notes by John Bartram to Short's Medecina Britannica, he says, "This precious root is a great resister of fermenting poisons and grievous pains in the bowels, taken in powder, or the root bruised and steeped in rum, of which take a spoonful at once."

Order 109.—IRIDACEÆ.—*Lindley.*

Calyx and corolla adherent or coloured; their divisions either somewhat adherent or wholly separate, sometimes irregular, the three petals being occasionally very short. Stamens 3, inserted at the base of the sepals; filaments distinct or connate; anthers with an external longitudinal dehiscence, fixed by their base, 2-celled. Ovary 3-celled, cells many-seeded; ovules anatropal; style 1; stigmas 3, often petaloid, sometimes 2-lipped. Capsule 3-celled, 3-valved, with a loculicidal dehiscence. Seeds spheroidal, angular, oblong or winged; albumen horny or firmly fleshy; embryo enclosed in it.

These are herbaceous or rarely suffruticose plants, generally smooth, with tuberous or fibrous roots, and mostly equitant and distichous leaves. Their inflorescence is in terminal spikes, corymbs, or panicles. The bracts are spathaceous, the partial ones often scarious. They are principally natives of the Cape of Good Hope, and the middle parts of Europe and North America; a few only are tropical.

The properties of the species of this order are very various: some are diuretic, purgative, and emetic, some are stimulating, whilst others again are edible. The roots of our native species of *Sisyrinchium* are acrid, and a decoction of them is said to be purgative, as are also those of *S. galaxioides* of Brazil. The tubers of *Morœa chinensis* are employed in decoction in India, and as a cataplasm in bites of venomous reptiles (Rheede, *Hort. Malab.*) Those of *Ferraria cathartica* and *F. purgans*, are prescribed in Brazil as purgatives (*Martius*). The roots of *Gladiolus communis* are considered in some parts of Europe as a specific in scrofula; the juice is given internally, and the bruised tuber is applied to the swellings. Those of *G. plicatus* of the Cape of Good Hope are eatable and nutritious (*Thunberg*). *G. segetum* was at one time supposed to be aphrodisiac. The stem of *Witseria maura* is stated to abound in a rich saccharine juice (*Bot. Reg.*)

Iris.—*Linn.*

Perianth tubular, with a petaloid membranous limb; sepaloid segments revolute, often bearded, the petaloid erect and converging. Stamens 3, hidden by the lobes of the style. Style 3-parted, towards the upper end, with petaloid segments, covering the anthers, and having a two-lipped transverse stigma below their apices. Capsule 3-celled, 3-valved, with a loculicidal dehiscence, coriaceous, with numerous flat or round and fleshy seeds.

An extensive genus, found at the Cape of Good Hope, in Siberia, Europe, North America, &c. They almost all have acrid roots, though in some species this quality is very slight.

1. I. florentina, *Linn.*—Rhizome horizontal, knotty, fragrant. Leaves broad, somewhat falcate, slightly waved at the edges, shorter than the stem. Flowers large, fragrant, pale, bluish-white, bearded; tube scarcely as long as the ovary.

Linn., *Sp. Pl.* 55 ; *Bot. Mag.* 671 ; *Flor. Med.* iv. 204 ; Stephenson and Churchill, i. 27 ; Lindley, *Fl. Med.* 575.

Common Names.—Florentine Iris ; Orris.

A native of Southern Europe, and cultivated in gardens on account of the beauty of its flowers. The recent root is acrid, and when chewed excites a burning heat in the mouth. When dried, much of this acrimony disappears. As found in the shops, it is in pieces of different forms and sizes, of a white colour, a pleasant smell, somewhat like that of violets, and a bitterish, acrid taste. It was formerly prescribed as an emeto-cathartic and diuretic, but is now seldom used in medicine, its principal employment being as an ingredient in tooth-powders, and as an article of perfumery. It, however, enters into the composition of the Lead plaster of the U. S. Pharmacopœia.

2. I. PSEUD-ACORUS, *Linn.*—Rhizome horizontal, depressed, brown, astringent. Leaves erect, ensiform, ribbed. Flowers large, yellow, beardless. Petals smaller than the lobes of the style.

Linn., *Sp. Pl.* 56 ; Smith, *Eng. Bot.* 578 ; *Flore. Med.* iv. 202 ; Lindley, *Fl. Med.* 575.

A common plant in wet situations, in most parts of Europe, and commonly cultivated in our gardens. The root is acrid and astringent, and has been recommended in scrofula. Cullen states that it is a powerful errhine, and also acts as a cathartic and hydragogue. (*Mat. Med.* 261.)

3. I. VERSICOLOR, *Linn.*—Rhizome horizontal, fleshy. Leaves ensiform, striated, sheathing. Bracts scarious. Peduncles of different lengths, flattened on the inside. Sepals spathulate, beardless. Petals erect, and with the sepals of a purplish colour, variegated with green and white. Stigmas petaloid, purple. Capsule 3-sided, with roundish angles.

Linn., *Sp. Pl.* 57 ; *Bot. Mag.* 21 ; Bigelow, *Med. Bot.* i. t. 16 ; Barton, *Fl. Phil. Prod.* i. 21.

Common Names.—Blue Flag ; Flag Lily.

A native of many parts of the United States in wet situations. The root is officinal. When recent it has little or no odour, but an unpleasant acrid taste which diminishes by age. It is cathartic, emetic, and diuretic. It was a favourite remedy with the Southern Indians, and was used by them in most cases requiring purgation. Dr. Elliott of Carolina, found it beneficial in dropsy, and Dr. Bigelow states that it is an active purgative, but is very apt to induce great nausea and prostration of strength. It is very seldom employed and might be advantageously stricken from the lists of the Materia Medica.

Our other native species, as *I. virginica*, *verna*, &c., have much the same properties. Numerous foreign kinds are used in their respective countries for a variety of purposes. *I. dichotoma* is employed in Siberia as an odontalgic, according to Pallas. *I. fœtidissima* was known to Dioscorides, who states that the root is a good vulnerary, and that its decoction is diuretic. It is used in some parts of Europe for the same purposes as the *I. pseud-acorus ;* the same may be said of *I. germanica*. The root of *I. sibirica*, is said by Gmelin (*Flor. Sib.* i. 29) to be prescribed in Siberia in syphilis, and Pallas states that it is astringent and vulnerary. One species, *I. edulis*, is edible, and forms an article of diet to the Hottentots.

Crocus.—*Linn.*

Perianth coloured, with a slender tube of twice the length of the limb; limb hexa-partite, segments equal, erect. Stamens 3, inserted on the tube; anthers sagittate. Stigmas 3, thick, long, usually crested. Capsule at first subterranean, but by the gradual prolongation of the peduncle finally emerging.

A small genus of bulbous-rooted plants, principally found in Southern Europe and Central Asia, one species of which is officinal.

Fig. 281.

C. sativus.
1. Petal and Stamen. 2. Style and Stigmas.

C. sativus, *Linn.*—Corm roundish; the integuments consisting of parallel fibres, which are distinct at the upper end. Leaves linear, long, flaccid, environed by long membranous bracts at base. Flowers axillary, with a 2-valved membranous spathe, appearing with the leaves, large, purple, striated, with a campanulate limb. Stigmas 3, deeply divided, linear-cuneiform, of a deep-orange colour, hanging down on one side of the flower, notched at the points, fragrant.

Linn., *Sp. Pl.* 50; Stephenson and Churchill, ii. 101; Lindley, *Fl. Med.* 576; *C. autumnalis*, *Eng. Bot.* 343.

Common Name.—Saffron Crocus.

This plant is a native of Greece and Asia Minor, and is much cultivated in some parts of Europe. There are numerous varieties of it, which have been described by some authors as species. It was early known to the Romans, and we find that the Cilician physicians who attended on Anthony and Cleopatra in Egypt, recommended Saffron as a remedy to clear the complexion and to deterge the body of bile. Pliny speaks of it as much employed, and says that wild plants produced a better quality than the cultivated. Saffron is also spoken of by Homer as one of the flowers composing the genial bed of Jupiter and Juno. It is likewise noticed in the Old Testament. (*Solomon's Song*, iv. 14.)

It flowers in the autumn, and perfects its seed the succeeding spring. The part used is the stigmas; to obtain these the flowers are gathered as soon as they unfold themselves, the stigmas are separated, and dried by an artificial heat. Saffron has a peculiar, sweetish, fragrant odour; a warm, pungent, bitter taste, and is of a deep orange-red colour. It contains Volatile oil, Wax, a peculiar colouring matter called *Polychroite*, Gum, &c. According to Pereira, 4,320 flowers are required to form an ounce of Saffron. It is said to be often adulterated, by admixtures of Safflower, the petals of Calendula, &c. The most esteemed is the English, but this kind is scarce, as the plant is now seldom cultivated in England.

Medical Uses.—Saffron was at one time much employed as an excitant, aromatic narcotic, and emmenagogue, but is now seldom used in Eng-

land or this country except as a colouring ingredient in compound preparations. It has some reputation in exanthematous diseases, as a means of developing the eruption, when it is tardy in its appearance. It has also been employed in nervous affections.

Group XLVII.—Amomales.

Order 110.—MUSACEÆ.—*Agardh.*

Flowers spathaceous. Perianth 6-parted, adherent, petaloid, in two rows, more or less irregular. Stamens inserted upon the middle of the divisions, some always becoming abortive. Anthers linear, introrse, 2-celled, often with a membranous crest. Ovary inferior, 3-celled, many-seeded, rarely 3-seeded. Ovules anatropal. Style simple. Stigma usually 3-lobed. Fruit either a 3-celled capsule, dehiscing longitudinally, or succulent and indehiscent. Seeds sometimes surrounded by hairs, integument mostly crustaceous. Embryo orthotropal, oblong, linear, or mushroom-shaped.

These are stemless or nearly stemless plants, but the leaves sheathing at base, sometimes form a spurious trunk, which is often of some magnitude; expansion of the leaves separated from the petiole by a swelling or tumour, and having fine parallel veins running regularly from the midrib to the margins. They are inhabitants of the tropics, Cape of Good Hope, Japan, &c. Although none of them are used in medicine, they require notice on account of their great importance as articles of food in tropical climates, especially certain species of *Musa*, known as Bananas and Plantains. These plants form the principal sustenance of the inhabitants of warm climates, and some idea of their fruitfulness may be drawn from the statement of Humboldt that the same space of ground that will grow thirty-three pounds of wheat, or ninety-nine pounds of potatoes, will afford four thousand pounds of Bananas.

Fig. 282.

M. sapientum.

Fig. 283.

M. paradisica.

They are very imperfectly known in an uncultivated state, and are propagated by suckers, the fruit being seedless; but at the same time numerous varieties are known. According to Boussingault, the Banana contains Sugar, Gum, Malic and Pectic acids, Albumen, &c. The two species now recognised are *M. sapientum* or Banana, and *M. paradisica* or Plantain; some botanists, however, are of opinion that these are merely

varieties, but they differ in several important characteristics; thus, in the latter the male flowers are permanent, whilst they are caducous in the former; the form of the fruit also is different. Ainslie states that Hindoo practitioners are of opinion that the Banana forms the most appropriate diet for invalids suffering from a redundance of bile, and heat of system.

Another species, *M. textilis*, is much prized for the fibres of its stem, which are very strong, and are known under the name of Manilla Hemp. This species bears a small fruit, which is furnished with seeds. Captain Wilkes (*Explor. Ex.* v. 288) says: "The fibre is derived from the stem, and the plant attains the height of fifteen or twenty feet. The usual mode of preparing the hemp is to cut off the stem near the ground, before the time, or just when the fruit is ripe. The stem is then eight or ten feet long below the leaves, where it is again cut. The outer coating of the herbaceous stem is then stripped off, until the fibres or cellular parts are seen, when it undergoes the process of rotting, and after being well dried in houses and sheds, it is prepared for market, by assorting it, a task which is performed by the women and children. That intended for cloth is soaked for an hour or two in weak lime water, prepared from sea-shells, and again dried."

The young shoots of all these species are eaten as a delicate food, as are also the root of *Heliconia psittacorum*, and the seeds of *Urania speciosa*; the pulpy arillus of this latter is of a brilliant blue colour, and yields an essential oil.

Order 111.—ZINGIBERACEÆ.—*Richard.*

Calyx superior, tubular, 3-lobed, short. Corolla tubular, irregular, with 6 segments in two whorls; the external one 3-parted, nearly equal, or with the odd segment sometimes differently shaped; the internal row (sterile stamens) 3-parted, with the odd one (labellum) larger than the others and often 3-lobed. Stamens 3, distinct, two of which are abortive, and one only fertile; this is opposite the labellum, and is inserted at the base of the middle segment of the true corolla. Filament often projecting beyond the anther, not petaloid. Anther 2-celled, with a longitudinal dehiscence; its lobes often surrounding the upper part of the style. Pollen globose and smooth. Ovary 3-celled. Ovules several, anatropal, attached to an axile placenta. Style filiform, with a dilated hollow stigma. Fruit generally capsular, 3-celled, many-seeded, sometimes berried. Seeds roundish or angular, with or without an arillus. Albumen mealy. Embryo in a vitellus.

These plants are all herbaceous and aromatic, peculiar to tropical climates, with creeping, and often jointed rhizomes; their stems are formed of the cohering bases of the leaves, which are simple and sheathing, with the nervures of their leaves diverging from a midrib. Many of them are employed in medicine as stimulants and carminatives, and a still greater number as condiments in warm climates.

Zinziber.—*Linn.*

Corolla with outer limb 3-parted, inner 1-lipped. Filament projecting beyond the anther in a simple incurved beak. Capsule 3-seeded, 3-valved. Seeds numerous, arillate.

A genus of tropical plants, having tuberous, jointed, creeping rhizomes, with annual stems, enclosed in the sheaths of distichous leaves, which latter are membranous. The flowers are in conical, radical, rarely terminal, solitary spikes, consisting of 1-flowered imbricated bracts. All the species are aromatic, and stimulant, but only one is recognised as officinal in the U. S. Pharmacopœia.

Z. OFFICINALE, *Roscoe.*—Rhizome tuberous, biennial. Stems erect, oblique, invested by the smooth sheaths of the leaves, annual. Leaves sub-sessile, on long sheaths, bifarious, linear, lanceolate, smooth above, and nearly so beneath. Sheaths crowned with a bifid ligula. Scapes radical, solitary. Spikes oblong, exterior bracts imbricated, 1-flowered, obovate, smooth, membranous at the edge; interior covering the ovary, calyx, and most of the corolla. Flower small. Calyx tubular, 3-toothed, opening on one side. Corolla with a double limb; outer of 3 nearly equal, oblong segments; inner a 3-lobed lip, of a dark purple colour. Sterile stamens subulate. Filament short. Anther oblong, double, crowned with a long curved horn. Ovary oval, 3-celled, with many ovules in each. Style filiform. Stigma infundibuliform, ciliate.

Roscoe, *Trans. Lin. Soc.* viii. 348; Roxburgh, *Fl. Ind.* i. 47; Lindley, *Fl. Med.* 539; *Amomum zinziber*, Linn.

Common Names.—Ginger; Narrow-leaved Ginger.

Fig. 284.

Z. officinale.
a. Flower. *b.* Stamen.

The native country of this plant is not known, but it has been cultivated in Asia from time immemorial. Mr. Phillips (*Cultivat. Veg.* 210), is of opinion that it is indigenous in China, and that its name is derived from Gingi, in that country. It is noticed by Dioscorides and Pliny. It was early introduced into the tropical regions of this country, where it is now much cultivated for the sake of its roots. In a young state these roots are preserved in sugar, forming a well-known sweetmeat; when old, they are taken up, scalded in hot water, and dried, in which state they constitute the usual ginger of commerce, or *Black ginger;* if they are scraped previous to being dried they form the *white* or *Jamaica ginger*. Most of the first kind which is in common use, comes from India, the latter, which is less common, is derived from the West Indies, usually by way of England. Pereira describes several other varieties, but as they are all similar in their properties, it is unnecessary to notice the differences they present.

They all are remarkable for their warm, pungent, aromatic taste; and impart their virtues to both water and alcohol. From the analysis of these roots by Morin and others, it appears that they owe their properties to the presence of a pale-yellow Volatile oil, and a soft, yellowish-brown Resin; besides which they contain Gum, some Salts, and the usual vegetable constituents.

Medical Uses.—Ginger is a stimulating and somewhat acrid aromatic; and as a stomachic is of much service in an atonic condition of the stomach, and where there is flatulence and spasmodic pain. When chewed it acts as a sialagogue; and, in powder, proves an efficient errhine. When applied to the skin, in the form of a cataplasm, it forms a good rubefacient counter-irritant. It may be administered in powder, in doses of ten grains to a scruple or more; or in tincture, in quantities from a drachm to two drachms. The most power-

ful preparation of it is the ethereal tincture. It is also used in the form of syrup, lozenges, &c. Its principal consumption is as a condiment.

Some other species are in very general use in the East Indies, and were formerly recognised in medicine, but are now never prescribed. Among these are *Z. cassamunar*, which furnished the "Yellow Zedoary" of the old pharmacopœias. Towards the close of the seventeenth century, a Dr. Peachy, in England, published a memoir on its virtues, which he said were wonderful in a variety of diseases. Another species, *Z. zerumbet*, or "Zerumbet root," was also employed, before Ginger was plentiful, but is now completely disused, as is also the rhizome of *Z. amaricans*, or Lampajum of Rumphius.

Curcuma.—*Linn.*

Tube of the corolla gradually enlarged upwards; limb with two lips, each 3-parted. Filament broad; anther incumbent, having two spurs at base. Style capillary. Capsule 3-celled. Seeds arillate, numerous.

These are acaulescent plants, with palmated tuberous roots, and bifarious, sheathing leaves. The scape is simple, lateral, or central. They are natives of tropical Asia, where several of the species are much esteemed as condiments. One species is officinal.

C. longa, *Linn.*—Tubers oblong, palmate, of a deep orange colour internally. Leaves long, stalked, lanceolate, tapering to each end, smooth, of a uniform green colour. Spike central, oblong, green.

Linn., *Sp. Pl.* 3; *Bot. Reg.* 1825; Roscoe, *Scitam.*, 3; Lindley, *Fl. Med.* 562.

Common Names.—Turmeric; Long-rooted turmeric; Indian saffron.

It is a native of the warm parts of Asia, and is extensively cultivated in India, China, Java, &c. It appears to have been known to the ancients, and to have been employed in India from the earliest ages, as a condiment. There are several varieties of the root found in commerce; the principal of which are the long and the round. They are all of a grayish-yellow colour externally, and of a more or less orange yellow within. Their odour is aromatic, somewhat like that of ginger, but peculiar; their taste is warm, spice-like, but bitterish.

Turmeric is a mild aromatic, and is mainly employed as a condiment, forming one of the constituents of Curry powder. In India it is an almost indispensable accompaniment to food. As a medicinal agent it formerly had some reputation in diseases of the liver; and is still used in India in the watery diarrhœa so frequent in that country; and is also considered as an excellent application, in powder, to foul ulcers. (*Ainslie*, i. 454.) Paper stained by it is a good test for the presence of the alkalies, being changed to a reddish or brownish colour by them.

A fecula resembling Arrow Root can be obtained from the roots of several of the species, as *C. angustifolia*, *C. leucorrhiza*, and *C. rubescens*. This is known under the name of East Indian Arrow-root. (See Fig. 40.) The root of *C. amada* is called "Mango ginger," in Bengal, from the fresh root having the peculiar smell of that fruit. *C. zeodaria* affords the Round Zedoary-root, formerly much employed in colic, cardialgia, torpor of the digestive organs, &c., and is still much prized as a remedy in India. It is spoken of in high terms by Avicenna, and is considered by the modern Arabs to be tonic, deobstruent, and aphrodisiac. *C. zerumbet*, or the Long Zedoary, has much the same properties. A species of Curcuma is supposed, by Martius, to fur-

nish the astringent Mexican drug, called "Cascara de Pingue," which abounds in tannin; but such can scarcely be the case.

AMOMUM.—*Linn.*

Inner limb of corolla 1-lipped. Filament dilated beyond the anther, with an entire or lobed crest. Capsule often berried, 3-valved, 3-celled. Seeds numerous, arillate.

A somewhat extensive genus of tropical herbaceous plants, with leaves in two rows, and having articulated, creeping rhizomes. As established by Linnæus, it included numerous species, now distributed in other genera.

A. GRANA PARADISI, *Linn.*—Rhizome perennial, ligneous, horizontal. Stems erect, simple, slender, 3 feet high, leafy. Leaves many, crowded, 2-ranked, alternate, lanceolate, with a long taper point, entire, smooth, single-nerved, with numerous oblique veins. Flower-stalks radical, short, ascending, with numerous sheathing bracts. Capsule oblong, ribbed, rounded triangular, beaked, coriaceous, beset with minute, deciduous, bristly hairs. Seeds numerous, roundish, of a rich golden-brown colour. The flower has not been satisfactorily described.

Linn., *Sp. Pl.* 2; Smith, *Rees' Cyclop.;* Stephenson and Churchill, ii. 106 (2); Lindley, *Fl. Med.* 565.

Most authors follow Afzelius in attributing Grains of Paradise or Malaguetta Pepper to this plant, but Roscoe is of opinion they are the product of his *A. meleguetta.*

2. A. MELEGUETTA, *Roscoe.*—Stem erect. Leaves 2-ranked, sub-sessile, narrow-lanceolate Scape radical, surrounded at base with about seven imbricated ovate, pointed, somewhat cuspidate bracts. Calyx cylindrical, monosepalous, green, spotted with red. Flowers cylindrical, with a double limb; outer in three segments, of which the middle is the largest; inner very large, pale-yellow at base, crimson at the margin. Filament strong, erect, clavate, three-lobed, with two spurs near the base of the lip. Anther two-lobed, in front of the filament. Style erect, tubular, expanding into a dilated stigma, having at base two linear processes. Capsule cylindrical, coriaceous. Seeds angular, light brown.

Roscoe, *Scitam.;* Pereira, *Mat. Med.* ii. 157.

Pereira (*l. c.*) is of opinion that the seeds of at least two species have been confounded in commerce under the name of Grains of Paradise, and figures two capsules, one of which he thinks may be from *A. grana paradisi* (Fig. 286), and the other possibly from *A. meleguetta* (Fig. 285).

Fig. 285. Fig. 286.

Capsules of Malaguetta Pepper.

A. meleguetta? A. grana paradisi.

Grains of Paradise are roundish or ovate, often angular, and somewhat

Fig. 287.

Capsule of A. angustifolium.

wedge-shaped, of a shining golden-brown, with minute warts and wrinkles. Their odour is faintly aromatic, and their taste aromatic, warm, and peppery. They contain a Volatile oil, acrid Resin, Tragacanthin, &c. Their properties are very analogous to those of pepper. They are seldom employed in this country, but are in much repute in Africa as a condiment. It is stated that in England they are consumed in large quantities to drug fermented and spirituous liquors.

3. A. ANGUSTIFOLIUM, *Sonnerat.*—Rhizome horizontal. Stems tall. Leaves lanceolate, much acuminated. Scape radical, closely imbricated, with mucronate bracts. Spikes linear-oblong, also imbricated with bracts. Calyx deep blood-red, obscurely 3-toothed, slit. Tube of corolla clavate. Lip obovate, cuneiform, 3-lobed, yellow. Capsule ovate, pointed, striated.

Sonnerat, *It.* ii. t. 137; Roxburgh, *Fl. Ind.* i. 39; Smith, *Rees' Cyclop.*; Lindley, *Fl. Med.* 565.

This species is a native of Madagascar, where it grows in wet situations. Every part of it, when bruised, diffuses a pleasant but powerful aromatic odour. The fruit is the *Cardamomum majus* of the older writers, the great or Madagascar Cardamom of Smith. The seeds are somewhat larger than Grains of Paradise, but have not their hot pungent taste, being more analogous, in this respect, to the Malabar Cardamom.

Fig. 288.

Capsule of A. cardamomum.

4. A. CARDAMOMUM, *Linn.*—Rhizome horizontal, creeping. Stems oblique. Leaves alternate, bifarious, connected by short petioles with their smooth, amplexicaul sheaths, lanceolate, entire, smooth, tapering to a fine point. Spikes radical, sessile, loosely imbricated, with 1-flowered, lanceolate, villous, scarious bracts. Calyx clavate, tubular, downy, 3-toothed, as long as the tube of the corolla. Tube of corolla slender, and a little incurved; outer series of three nearly equal, pellucid divisions; inner rather longer than the exterior, somewhat 3-lobed, with a crenate, curled margin. Filaments scarcely half as long as the limb, incurved over mouth of tube. Anther double, large, with a 3-lobed, concave crest. Capsules sessile, about the size of a black currant, globular. Seeds rounded-angular, dotted, brown.

Linn., *Sp. Pl.* 2; Roxburgh, *Fl. Ind.* i. 37; Lindley, *Fl. Med.* 564.

A native of the mountainous districts of many of the East Indian Islands, and cultivated in India. The fruit is the Round Cardamom of the shops, and the seeds have much the same taste and properties as the Malabar or true Cardamom. They are seldom employed in this country or England. They are considered by Sir J. E. Smith to be the *Amomum verum* of the older Pharmaceutists, and were known to Dioscorides and Pliny, being the *Amomi uva* of the latter.

Besides these, several other species have been noticed as affording a fruit having the properties of Cardamom. Dr. Pereira has ably investigated this subject, and has done much to elucidate it, though great uncertainty still remains with regard to some of the fruits known as Cardamoms. The following is an abstract of his views.

5. A. CLUSII, or the Long-seeded Cardamom, has an ovate, pointed, somewhat triangu-

lar, cartilaginous, striated, smooth, yellowish-brown capsule, containing oblong or ovate, inclining to cylindrical, dark-brown, highly-polished, pale yellowish-brown seeds.

These have very little aroma.

6. A. MACROSPERMUM, or Large-seeded Guinea Amomum, was mistaken by Gærtner for the Malaguetta Pepper. It has an ovate, pointed, somewhat striated capsule, with a corrugated beak. The seeds are ovate or nearly globular, or somewhat oblong, smooth, polished, of a greenish-gray or lead colour, with a marked umbilicated scar at base, having a whitish or pale-yellow margin. Their flavour is slightly aromatic.

Fig. 289.

Capsule of A. clusii.

Fig. 290.

Capsule of A. macrospermum.

Fig. 291.

Capsule of A. maximum.

It inhabits Africa, in the vicinity of Sierra Leone.

7. A. MAXIMUM.—Capsule nearly globular, of the size of a gooseberry, 3-celled, 3-valved, having from seven to thirteen firm, short, ragged, membranaceous wings. Seeds dull, dirty-brown, with a shallow groove on one side. Their taste and odour are slightly aromatic.

This plant is a native of the Malay Islands, Java, &c., and is cultivated in Nepal. Dr. Pereira is of opinion that it furnishes the Java Cardamom; this, though much employed in the East Indies, is very little known in commerce.

The seeds of *A. aromaticum* and *A. grandiflorum* are also aromatic, and are used as condiments in their native countries.

ELETTARIA.—*Maton.*

The characters are similar to those of Amomum, except that the tube of the corolla is filiform, and the anther is naked.

These plants formerly constituted a part of the genus *Amomum*, were separated by Dr. Maton under the name of *Elettaria*, were also included in *Alpinia* by Sir J. E. Smith, Roscoe, and others, and then placed in *Renealmia*, in *Bot. Repos.* The differences between them and Amomum are so trifling, that they might, without impropriety, form a section of that genus, more especially as their properties are identical.

E. CARDAMOMUM, *Maton.*—Rhizome with numerous, fleshy fibres. Stems perennial,

Fig. 292.

E. cardamomum.

erect, smooth, jointed, covered with the spongy sheaths of the leaves. Leaves bifarious, sub-sessile on the sheaths, lanceolate, sharp-pointed, a little villous above, sericeous beneath, entire. Sheaths somewhat villous, with a rounded ligula rising over the mouth. Scapes several, radical, prostrate, flexuose, jointed, branched; branches alternate, sub-erect. Bracts solitary, oblong, smooth, sheathing. Flowers alternate, on short peduncles, at each joint of the racemes. Calyx infundibuliform, permanent, finely-striated. Tube of corolla slender, as long as the calyx; limb double; exterior of 3-lobed; inner, obovate, longer than the outer, slightly 3-lobed. Filaments short, erect. Anther double, emarginate. Style slender. Stigma infundibuliform. Capsule oval, somewhat triangular, 3-celled, 3-valved. Seeds coriaceous, pale-brown or blackish.

Maton, *Trans. Linn. Soc.* x. 254; Lindley, *Fl. Med.* 566; *Amomum repens*, Sonnerat, *Voyages*, ii. 240, t. 136; *A. cardamomum*, White, *Trans. Linn. Soc.* x. 230; *Alpinia repens*, Smith, *Trans. Linn. Soc.* viii. 353; *Al. cardamomum*, Roscoe, *Monan. Pl.* t. 38; Roxburgh, *Fl. Ind.* i. 70.

This species is found in the mountainous parts of the coast of Malabar. There is every evidence that it produces the True or Malabar Cardamoms. It is extensively cultivated in Malabar in the following manner. Previous to the rainy season in June, a spot on the shady side of a well-wooded hill is selected, on which is a large tree, around which all the shrubs and weeds are removed, when the tree is cut down. From the concussion produced, the earth in the vicinity is loosened, and in a month's time the young Cardamom plants make their appearance. These attain maturity about the fourth year, at which time the radical inflorescence occurs, succeeded by the fruit, which is ripe in November, and requires no other preparation than drying in the sun. The plants bear until their seventh year, when they are cut down, and the young shoots that arise, treated in the same manner. (White, *l. c.*)

Fig. 293.

Malabar Cardamoms.
a. Shorts. *b*. Short-longs. *c*. Longs.

There are three varieties of Malabar cardamoms recognised in commerce: Shorts, Short-Longs, and Longs; these, according to Mr. White, are all furnished by the same plant. They are all ovate-oblong, obtusely triangular, from 3 to 10 lines long, coriaceous, ribbed, of a grayish or brownish-yellow colour. The seeds are numerous, angular, reddish or blackish-brown, and rugose. They have an agreeable, aromatic odour, and a warm, aromatic taste. They contain Essential oil, Fixed oil, Fecula, Colouring matter, &c. The active constituent is the essential oil.

Cardamoms are principally employed in medicine as a flavouring ingredi-

ent in various mixtures, and to correct the drastic operation of some purgatives, but are occasionally administered as a stimulant and carminative, especially in the form of a simple or compound tincture. In the East Indies they are considered as a necessary of life, as a grateful and salubrious accessory to the vegetable diet of the natives.

2. E. MAJOR, *Smith.*—Rhizome with numerous fibres. Stem erect, smooth, covered with the leaf-sheaths. Leaves sessile on the sheaths, silky beneath; acuminate; the shorter ones lanceolate, the larger oblong-lanceolate. Sheaths about half the length of the leaves, with a roundish ligula. Scape radical, flexuose, jointed, branched; branches alternate, suberect. Bracts solitary, sheathing each joint, marcescent. (Flowers not known.) Capsules one or two on each branch, with the permanent calyx attached.

Fig. 294.

E. major.

Smith, *Rees' Cyclop.* xxxix.; Pereira, *Mat. Med.* ii. 164.

A native of Ceylon. Dr. Pereira described it, as above, from specimens from that island, and with Sir J. E. Smith, who was acquainted with the capsule only, is of opinion that it must be a species of Elettaria, although the flowers have not been seen. The capsule, which is called Ceylon Cardamom, is lanceolate-oblong, acutely triangular, more or less curved, with flat-ribbed sides. At one extremity is the long, cylindrical, permanent 3-lobed calyx, and at the other the footstalk. The pericarp is coriaceous, tough, brownish, of a brownish or yellowish-ash colour. The seeds are angular, rugged, of a yellowish-red colour, and have a peculiar, aromatic odour, and warm, spicy taste. They are not considered as valuable as the Malabar cardamoms.

Fig. 295.

Ceylon Cardamom.
a. Calyx. *b*. Stalk.

3. E. CARDAMOMUM MEDIUM, *Nees.*—Leaves petiolate above the sheaths, linear-lanceolate, downy beneath. Sheaths villous, with an obtuse ligula. Scapes radical, laxly imbricated, lower part hid in the earth. Flowers numerous, with lanceolate, ribbed, smooth bracts. Capsules on rather long pedicels, ovate-oblong, each angle marked with a larger vertical wing, and two smaller on the flat sides, 3-celled. Seeds numerous, obovate, with a groove on one side.

Nees and Eberm., *Handbuch*, i. 252; Lindley, *Fl. Med.* 567; *Alpinia, c. medium*, Roxburgh, *Fl. Ind.* i. 74.

A native of hills in several parts of India. Dr. Lindley is of opinion that this plant produces the *Cardamomum medium* of the older writers, but it is by no means certain, though the form of the capsule and the character of the seeds are analogous.

ALPINIA.—*Swartz.*

Tube of corolla short; inner limb 1-lipped, either toothless, or with a small tooth at base

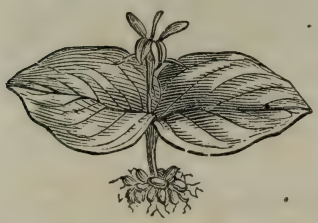
on each side. Filament linear, scarcely prolonged beyond the emarginate anther. Capsule berried, 3-celled. Seeds arilled, few or numerous.

A genus of tropical plants with thick, tuberous, horizontal roots, producing numerous, perennial stems, furnished with bifarious, lanceolate leaves, having a slit, ligulate sheath. Their inflorescence is panicled, or in loose, terminal racemes, or spikes. The roots of *A. galanga* are the greater Galangal of the shops. This is in cylindrical or somewhat tuberous pieces, of a reddish-brown colour externally, and of a pale reddish-white within. It has a pleasant aromatic odour, and a pungent, warm taste. Its properties are very analogous to ginger, but is never employed in this country, but is much esteemed in India, though not considered as energetic as the Lesser Galangal, which is the product of an unknown plant. Both of them are natives of China. *A. racemosa*, of Jamaica, according to Desportes, bears seeds which are exceedingly poisonous, causing the most violent symptoms, but which may be relieved by a free use of lemon juice (*Fl. Med. Antill.* iii. 91). The root of *A. aromatica* is used in Brazil as a carminative, (*Martius.*)

Kæmpferia.—*Linn.*

Tube of corolla long, filiform; limb somewhat bi-labiate, each segment 3-parted. Filament short, expanded above the anther into a bifid crest. Capsule 3-celled, many-seeded.

Fig. 296.



K. galanga.

A genus of East Indian plants having much the habit of Curcuma, and whose roots are very analogous in their properties. At one time it was supposed that the Zedoaries of commerce were obtained from them, and Fée still is of opinion that they furnish them, but the observations of Roxburgh have clearly shown that these articles are the product of *Curcuma*. *K. galanga* affords the spurious Galanga root, the true being derived from an *Alpinia*. These roots are employed medicinally in India, and were formerly in some repute in Europe, but are not at present recognised as officinal.

Renealmia exaltata, or a plant closely allied to it, is spoken of by Dr. Hancock, as bitterish and sub-acrid, and used in British Guiana as a diaphoretic and diuretic, or in large doses as emetic; it is much esteemed in dropsy, rheumatism, dysentery, &c. The part employed is the bruised rhizome. Pöppig states that the leaves of several species are thought useful in pains in the limbs. The roots of *Costus arabicus*, &c., were at one time in high repute, but are not now employed, and it is extremely doubtful from what plants the ancient remedies of this name were procured. Some of the Brazilian species are stated by Martius to have a sub-acrid, mucilaginous juice, which is beneficial in nephritic disorders and gonorrhœa.

Order 112.—MARANTACEÆ.—*Lindley.*

Calyx superior, 3-sepalled, short. Corolla tubular, irregular, with the segments in 2 whorls; the outer 3-parted, nearly equal; the inner very irregular; one of the lateral segments usually coloured, and different from the rest. Stamens 3, petaloid, distinct,

only one fertile. Filament petaloid, either entire or 2-lobed, one of the lobes bearing the anther on its edge; anther 1-celled, with a longitudinal dehiscence. Pollen round. Ovary 1—3-celled; ovules solitary, erect and campylotropal, or numerous, and anatropal; style petaloid, or swollen; stigma either the mere naked end of the style, or hollow, cucullate and incurved. Fruit capsular. Seeds round, exarillate.

These are all herbaceous, tropical plants, wholly destitute of aroma. Their rhizomes are mostly tuberous, and abound in fecula. In their leaves, inflorescence, and habit, they closely resemble the species of the last order. The greater part of them are found in tropical America and Africa; some are natives of the East Indies.

MARANTA.—*Linn.*

Corolla unequal, one of the inner segments lip-like. Stamens petaloid, one fertile, with the anther on its edge. Style cucullate, adhering to the edge of the sterile filament. Ovary 3-celled, smooth; ovules solitary. Fruit even, dry, 1-seeded.

The species are caulescent plants, with succulent roots or rhizomes; the stems are often dichotomously branched. One species is officinal.

M. ARUNDINACEA, *Linn.*—Root perennial, fibrous, with numerous fusiform, succulent, pendulous tubers. Stem much branched, slender, tumid at the joints, covered with fine hair. Leaves alternate, with long, leafy, hairy sheaths, ovate, lanceolate, a little hairy beneath, pale-green. Panicles terminal, lax, spreading, with long, linear, sheathing bracts. Calyx green, smooth. Corolla small, white. Ovary hairy. Fruit mealy, globular, with three obsolete angles.

Linn., *Sp. Pl.* 2; Redouté, *Liliac.* t. 57; Lindley, *Fl. Med.* 569.

This species seems originally to have been a native of Dominica, whence it was carried to Barbadoes, and afterwards to the other islands, being now cultivated in the whole group. It affords the fecula known as West Indian or Bermuda Arrow-root. This is prepared by washing the tubers, and beating them to a pulp, which is thrown into a vessel of water. The whole is well stirred, and the fibrous portions separated and rejected. The fluid is then strained and permitted to rest, when the fecula subsides; this, after being well washed and drained, is dried in the sun.

Good arrow-root is white, and without a marked taste or odour. It is usually in the form of a light, opaque powder (see fig. 39), and is nutritive, emollient, and demulcent, and hence is much employed as a diet for invalids and children. There are a variety of feculas, of analogous characters, procured from different plants (see *Introduction*, p. 40). Aublet states that in Guiana people eat the root of this plant, when roasted, as a cure for intermittent fevers (*Guiane*, 3). It is said to derive its English name from having been considered as an antidote to the effects of wounds from poisoned arrows.

Some other species of the genus likewise afford a good fecula. Thus, *M. allouya*, of Cayenne and St. Domingo, is said to be equal to the officinal kind. The roots are eaten, when roasted, as a substitute for potatoes. *M. indica* yields an abundant product; this is a native of the East Indies, and is said by M. Tussac to be a species distinct from *M. arundinacea*, and distinguished by the leaves being smooth on both sides; but a more recent examination of it by Wickström has shown it to be only a variety (*Pereira*, ii. 149). The roots of *M. nobilis* of the West Indies, and *M. ramosissima* of India, also abound in a nutritious starch.

CANNA.—*Linn.*

Corolla unequal, variable in the number of its parts, scarcely lip-shaped in any one of

the lobes. Stamens petaloid, one with half an anther on its edge. Style flat, straight, almost free. Ovary 3-celled, with many ovules, granular. Fruit membranous, 3-valved, with a deciduous, granular surface. Seeds round, smooth.

An extensive genus of herbaceous tropical plants, usually with tuberous, creeping rhizomes. Stems erect, with distant sheathing leaves. The inflorescence is in terminal spikes or racemes. The flowers are in glumaceous bracts. The species are most numerous in the western hemisphere. The tuberous-rooted ones yield a fecula much resembling arrow-root, one variety of which is known under the name of "*Tous les mois*," but it is very uncertain from what species it is procured. Some writers have attributed it to *C. coccinea*, but it is certainly not from the plant generally known under that name to botanists; by others it is said to be derived from *C. achiras;* but this is a Peruvian plant, whereas the Tous les mois comes from St. Kitts. Be its origin what it may, it is an excellent Arrow-root, and may always be recognised by the great comparative size of its granules (see fig. 43). The roots of several species are used as food in Peru, but those of *C. achiras* are most esteemed. Martius states that the tubers of *C. aurantiaca*, *glauca*, &c. of Brazil, are diuretic and diaphoretic, and are somewhat allied to *Orris-root* in their action.

The large leaves of *Calithea cachibou* are employed in South America for a variety of domestic purposes; and it is stated by Kunth that the white, cretaceous coating of the under surface of the leaves, when triturated with water, is considered to be efficacious in strangury (*Nov. Gen.* i. 328). Several of the *Phryniums* afford a tough fibre, which can be applied to all the uses of hemp.

Group XLVIII.—Orchidales.

Order 113.—ORCHIDACEÆ.—*Lindley.*

Flowers hermaphrodite, irregular, variable in form. Perianth adherent, variable, herbaceous or coloured, membranous or fleshy, permanent or withering; the parts in two rows, rarely in three, free, or connected in various modes, often resupinate from a curve in the ovary. Sepals 3, equal at base, or variously expanded there; the two lateral are in front when the ovary is twisted, and the third dorsal, sometimes surrounded by a true calyx. Petals mostly 3, rarely 1, placed between the sepals; the 2 lateral like the dorsal sepal, the third variously formed and appendaged. Stamens and style consolidated into a central column. Stamens 3, opposite the sepals, one only fertile (except in Cypripedium); anthers usually 2-celled; cells divided by 2—4 partitions; pollen powdery, or in grains, or in wedge-like masses; these masses free, or connected to the anther by a caudicle. Ovary adherent, 1-celled, of 6 carpels; style never distinct (except in Cypripedium); stigmas usually confluent in a mucous disk. Capsule rarely fleshy, indehiscent, pod-shaped, separating into 6 dry, rigid valves, with horizontal cells, 3 of which only contain seeds. Seeds extremely numerous, minute.

A very extensive and complicated order, consisting of perennial herbs or shrubs, found in most parts of the world, having fibrous or fasciculated roots, which are often fleshy, and containing much fecula or bassorin. The leaves are flat, terete or equitant, usually sheathing, membranous, coriaceous or rigid, never lobed, sometimes edged with cartilaginous teeth. The flowers are either solitary, clustered, spiked, &c., but always furnished with a single bract; often very fragrant, sometimes fetid, and not unfrequently without odour. With very few exceptions, the plants of this order, as far as has been ascertained, have no remedial properties. It is probable, however, that a more extended study of them will show that many species are endowed with active qualities.

The nutritive substance called Salep is supposed to be principally derived from some species of Orchis, as the roots of *O. mascula* and other European species furnish an analogous product. Most of the Salep of the shops comes from Asia, where it is prepared in Northern India, Persia, Turkey, &c. Dr. Royle states that a good article is procured from several species of *Eulophia*. Sprengel is of opinion that the Salep of the ancients was the product of *O. papilionacea*. It is highly probable that all the species of Orchis and its allied genera, with fleshy roots, will afford this article. Salep is in the form of hard, horny, semi-transparent, somewhat rounded pieces, having scarcely any odour, but a mild, mucilaginous taste. For use they require to be powdered, which is an operation of some difficulty, from their tough and corneous consistence. They consist principally of Bassorin, with some Gum, and a little Starch, and are considered as containing a very large proportion of nutriment in a small bulk. Salep is but little employed in this country, except in the composition of Castillon powders, a nutritive and bland article of diet for invalids.

Several species of *Vanilla* afford the aromatic beans so much employed by the confectioner. These are the product of *V. aromatica*, *V. sativa*, *V. sylvestris*, and *V. pompona;* the first of which is the most generally known. Dr. Lindley says that most of the beans of commerce are furnished by *V. planifolia;* but this does not agree with the observations of Schiede, who studied the genus in Mexico. Vanilla contains an Essential oil and Benzoic acid; but Bucholz says that no volatile oil can be obtained on distillation. In addition to the flavouring properties of this article, it has some medicinal qualities, and has been successfully employed as an aromatic stimulant, in low fevers, hysteria, rheumatism, &c. It is also considered as acting powerfully on the generative system as an aphrodisiac. The dose is from eight to ten grains. *V. claviculata* is regarded as a good vulnerary and anti-syphilitic in the West Indies.

Fig. 297.

Vanilla aromatica.

A few species of *Epidendrum* have somewhat active properties. Thus, *E. bifida*, of Guinea, affords a juice which is said to be purgative in doses of a tablespoonful; and, in Tortola, is also considered to be an anthelmintic and diuretic. *E. auriculatum*, is used as a vermifuge in India; and is, likewise, employed in dropsy. (*Ainslie*, ii. 439.) The crushed roots of *E. scriptum* are employed, in the same country, as a maturating poultice to phlegmonous tumours, as are also those of *E. tenuifolium;* the powder of this latter, mixed with vinegar, is deemed efficacious in hæmorrhoids, leucorrhœa, and gonorrhœa.

According to Browne (*Jamaica*), the cormus of *Bletia verecunda* is bitterish and somewhat acrid, and when dried forms an excellent stomachic. Some of the South American *Catasetums*, *Cyrtopodiums*, &c., yield a viscid juice, which, when inspissated by boiling, becomes a tenacious glue; and that of our native *Aplectrum hiemale*, or Putty-root, is a good cement for glass or china. The bulbs of another native, the *Arethusa bulbosa*, are stated by Schoepf to be useful in toothache, and for maturating boils. The leaves of *Goodyera pubescens* have been used by empirics in scrofula, both internally, in decoction, and externally, as a cataplasm, with some success. *Spiranthes*

diuretica has some reputation in Chili as a diuretic; where, also, *Chlorœa disoides* is considered to augment the secretion of milk.

Cypripedium.—*Linn.*

Lip ventricose, inflated, saccate. Petals 4, the lower one bifid. Gonophore bearing 2 anthers, and terminating behind in a petaloid lobe.

This small genus is principally American. Its name means the Shoe of Venus, from the slipper-like form of the labellum. The species are highly ornamental and showy, and are, it has been stated, active antispasmodics; but, have not been recognised as officinal. As, however, they are in very general use in domestic practice and with empirics, and have certainly been found beneficial in a variety of instances, they require a more extended notice. All the species are stated to be equally active; but the following has been selected as being extremely common in some parts of the country, though rare in the vicinity of Philadelphia, where it is replaced by the *C. acaule*.

Fig. 298.

C. pubescens.

C. pubescens, *Willdenow.* — Stem leafy; leaves broad, often acute, and pubescent. Lobe of the style triangular-oblong, obtuse. Sepals ovate-oblong, acuminate. Petals very long, linear, and contorted. Lip compressed, shorter than the other petals.

Willdenow, *Hort. Berol.* i. t. 13; Barton, *N. A. Flor.*, *t.* 74; *C. luteum*, Rafinesque, *Med. Flor.* i. 140; *C. flavescens*, Redouté, *Liliac.*; *C. calceolus*, β. Linn. *Sp. Pl.* 1346.

Common Names. — Yellow lady's slipper; Yellow moccasin flower; Noah's ark, &c.

Found in most parts of the United States, though rare in some localities. It flowers in May and June. The roots are the parts used in medicine. These are perennial, of many long, fleshy, cylindrical fibres, of a pale-yellow colour. They have a pungent, but viscid taste, and a peculiar and somewhat unpleasant odour. No analysis has been made of them.

Medical Uses.—These roots were employed by the Indians, and have been held in high esteem, in domestic practice, in many parts of the country, as sedative and antispasmodic, acting much like Valerian in alleviating the nervous symptoms attendant on many diseases; and are said to have proved very useful in hysteria and even chorea. The usual mode of administration

is in powder, of which the dose is a teaspoonful. It is probable that the tincture would be an efficient mode of administration.

The other native species, as *C. acaule*, *C. spectabile*, &c., are said to possess the same properties; and Gmelin states (*Flor. Siber.* i. 6), that the *C. calceolus* of Europe, is considered efficacious in Epilepsy.

Group XLIX.—Liliales.

Order 114.—MELANTHACEÆ.—*Brown.*

Flowers hermaphrodite or monœcious. Calyx and corolla alike, free, petaloid, in 6 segments, or from cohesion tubular; usually with an involute æstivation. Stamens 6. Anthers extrorse. Ovary 3-celled, many-seeded. Style 3-parted. Stigmas undivided. Capsule usually separable into 3 pieces, mostly with a loculicidal dehiscence. Seeds with a membranous testa. Albumen dense, fleshy, or cartilaginous. Embryo very minute.

A large order of bulbous, tuberous, or fibrous-rooted herbaceous plants, varying much in appearance. The species are very abundant at the Cape of Good Hope, and are not uncommon in Europe, Asia, and North America. The general character of the order is virulence; for, although some of them are mild and innocuous, the larger proportion of the species are acrid and poisonous. Several of them are officinal, and hold a high rank in the list of medicinal agents.

Besides those to be noticed at greater length, the following are deserving of a brief mention. *Xerophyllum setifolium*, or Turkey's Beard, a native of sandy situations in many parts of the United States, has been shown by Mr. William Procter (*Am. Jour. Pharm.* N. S. v. 183) to contain an alkaloid, which he terms *Xerophia*, which is decidedly bitter; but its action on the system has not been ascertained, though it is probably analogous to that of the others from this order. The root of *Helonias frigida*, of Mexico, is an active poison, and even the foliage stupefies horses that feed on it. That of *H. dioica*, of this country, vulgarly called "Devil's Bit," is said to be anthelmintic in infusion; its tincture is bitter and tonic. In *Melanthium virginicum* it is still more active, as it will operate as an active poison, and is a certain but somewhat dangerous cure for the itch, if used in decoction as a wash. *Amianthium erythrospermum*, or Fall Poison, is also very energetic; a decoction of the root is employed in some parts of the country to destroy flies, and its foliage poisons cattle feeding upon its leaves in the autumn. The roots of the different species of *Uvularia* are somewhat acrid and mucilaginous when fresh; and a decoction of them has been employed as a domestic remedy in sore mouth and affections of the throat, and also considered as an alexipharmic in snake-bites. The roots are, however, edible when cooked, and the young shoots are a very good substitute for asparagus.

Asagræa.—*Lindley.*

Flowers polygamous, racemose, naked. Perianth 6-parted. Segments linear, veinless, almost equal, with a nectariferous pit at base, equal to the stamens. Stamens alternately longer. Anthers cordate, after-dehiscence scutiform. Ovaries 3, simple, tapering into an obscure stigma. Fruit of 3 acuminate, chartaceous follicles. Seeds scimetar-shaped, wrinkled, winged.

There is but one species known, a native of Mexico. This is officinal.

A. OFFICINALIS, *Lindley.*—Bulbous. Leaves linear, tapering to a point, even, smooth, entire, furrowed above, carinate beneath. Scape naked, tall, simple, with a long raceme. Perianth deeply 6-partite, spreading, permanent, with linear, thick, obtuse segments, three of which are rather broader than the others. Filaments 6, somewhat clavate, those opposite the broad segments of perianth longer than the others. Anthers rather large, cordate, obtuse. Ovary of 3 cells, united by the sutures. Fruit 3-capsular.

Lindley, *Bot. Reg.* 1839; *Helonias officinalis*, Don, *Edin. Phil. Jour.* 1832; Lindley, *Fl. Med.* 586; *Veratrum officinale*, Schlechtendal, *Linnea*, vi. 45.

This plant, which is known in its native country under the name of Cebadilla or Sabadilla, was noticed by Monardes, under the former appellation, in 1573. He states that the seeds are very acrid, and even caustic: "Sic, ut ubi cauteriam necessarium est in gangrenis et putridis impurisque ulceribus eosdem prebeat effectus;" and adds that they are also employed to destroy vermin breeding in wounds and sores. For a long time it was supposed that Cebadilla seeds were furnished by the *Veratrum sabadilla;* but Scheide discovered that they were produced by a wholly different plant, on which Lindley erected the genus *Asagræa.*

The Cebadilla of the shops consists of the follicles, seeds, stalks, and abortive flowers. The follicles are oblong-ovate, acuminate, of a pale yellowish-brown or reddish-gray colour, and of a thin, dry, papery consistence. The seeds are small, scimetar-shaped, pointed, shining, wrinkled, slightly winged, and of a blackish-brown tint. Their odour is very slight, but their taste is bitter and acrid. From an analysis by Meissner (*Pereira*, ii. 106), it appears that they contain Fatty matter, Wax, Veratria, Extractive, Gum, Resin, &c. Several other components have been found by chemists; but the main properties depend on the Veratria, which exists, or rather can be extracted, in about the proportion of a drachm to the pound of Cebadilla.

Veratria is in the form of a white, uncrystallizable powder, of a somewhat resinous appearance. It has an extremely acrid taste; it is nearly insoluble in water, but is dissolved by alcohol and ether; it is coloured first red and then violet by sulphuric acid.

Medical Uses.—The seeds have been employed as an anthelmintic, but require much caution in their administration. An extract has proved beneficial in painful rheumatic and neuralgic affections. But the principal employment of them has been for the destruction of vermin in the hair; but they should never be advised for this purpose, as dangerous consequences have resulted from resorting to them with this view. Veratria has of late years attracted much attention as a remedy in neuralgic rheumatism, nervous affections, dropsy, &c., both internally and externally. As it is an irritant poison of great energy, the utmost vigilance is necessary where it is prescribed. The dose internally is one-sixteenth to one-twelfth of a grain. (For a full account of the therapeutical employment of this substance, see Turnbull, *On the Med. Prop. of the Ranunculaceæ*, and Dunglison, *New Remedies*, 586.)

VERATRUM.—*Linn.*

Flowers polygamous. Perianth 6-parted. Segments broad, concave, imbricated, nearly equal, striated, without a pit at base. Stamens 6, equal, inserted at the base of the segments. Filaments subulate. Anthers reniform, with confluent cells. Ovary with 3 divaricating stigmas. Capsule 3-horned, separating into 3 many-seeded follicles. Seeds compressed, winged at the apex.

A small genus, principally confined to the northern hemisphere. The species have fibrous or branching roots, and ovate or ovate-oblong, plaited, numerously-ribbed leaves, and greenish, paniculated flowers.

Fig. 299.

V. album.

V. ALBUM, *Linn.*—Rhizome oblong, præmorse, of a blackish colour externally, and whitish within. Stem tall, striated. Leaves broadly-ovate, plaited, somewhat acute. Panicle terminal. Flowers yellowish or greenish-white. Segments spreading, serrulate, and somewhat undulated.

Linn., *Sp. Pl.* 1479; Jacquin., *Fl. Aust.* 335; Stephenson and Churchill, iii. 136; Lindley, *Fl. Med.* 585.

Common Name.—White Hellebore.

The White Hellebore is a native of mountainous regions in many parts of Europe, and presents several varieties, which have been considered as distinct species by some botanists. It has generally been asserted that this plant was known to the ancients, and used as a remedy by Hippocrates; but much difference of opinion exists among those who have investigated the subject, some being fully convinced that it is identical with the White Hellebore of Dioscorides, whilst others declare that it is a wholly distinct plant; thus Dr. Sibthorp (*Prod. Fl. Græc.*) is of opinion that the Greek writer referred to *Digitalis ferruginea.*

The officinal portion is the root; this is in cylindrical somewhat conical pieces, with numerous small radicles. They are corrugated, and of a blackish-brown colour. Their odour is very slight, and their taste is at first sweetish, but afterwards bitter and acrid. This root contains Veratria, in the state of a super-gallate; Fatty matter, containing a Volatile acid; Extractive, &c.; another principle called *Jervin* has also been detected in it, which is crystallizable.

Medical Uses.—White Hellebore is an active irritant, and in large doses is very poisonous. When applied locally it operates like the other powerful acrids. When administered internally in small doses it promotes the secretions, but in large ones causes vomiting, purging, pain in the bowels, and much prostration of strength. It has been employed as a hydragogue purgative in a variety of diseases, and had some reputation in the treatment of gout. It is now rarely used, on account of the uncertainty of its operation, except as an external application, in the form of an ointment, in cases of obstinate cutaneous affections, and especially of itch. A decoction is also popularly employed for the destruction of vermin infesting the hair or body.

2. V. VIRIDE, *Aiton.*—Rhizome thick, fleshy, tunicated above and solid below, with numerous whitish radicles. Stem tall, roundish, striated, pubescent. Leaves sheathing, lower ones large, oval, acuminate, pubescent, strongly ribbed and plaited; upper leaves generally narrower. Flowers in compound racemes, terminal. Peduncles downy. Bracts boat-shaped, acuminate, tomentose. Perianth of 6 green, oval, acute segments, the alternate ones longest; all terminating at base in a sort of claw. Stamens 6, with recurved filaments, and roundish 2-lobed anthers. Ovaries 3, cohering, with acute recurved styles. Fruit consisting of 3 capsules united together, separating at top, and dehiscing on their inner side. Seeds flat, winged, imbricated.

Aiton, *Hort. Kew.* iii. 422; Lindley, *Fl. Med.* 585; Bigelow, *Med. Bot.*

ii. t. 93; Worthington, *Am. Jour. Pharm.* N. S. iv. 89; *Veratrum album*, Michaux, *Fl. Bot. Am.* ii. 249; *Helonias viridis*, *Bot. Mag.* 1096.

Common Names.—Swamp Hellebore; Indian Poke; Itch Weed.

This plant is a native of many parts of the United States, usually growing in damp meadows. It flowers from May to July. The root is officinal in the National Pharmacopœia. It consists of a tunicated top, with a thick fleshy base, having numerous radicles attached. In a fresh state it has a disagreeable fetid odour, which disappears on desiccation. The taste is at first sweetish, afterwards bitter, followed by an acrid pungent sensation, which persists for some time. It has been examined by Dr. Osgood (*Am. Jour. Med. Sci.*), Mr. Marshall (*Am. Jour. Pharm.* N. S. iii.), and by Mr. Worthington (*l. c.*) The latter, who made a full analysis of it, found Veratria, Gallic Acid, Extractive, &c.

It was known to the Indians as a poison, and was employed by them, according to Joscelin (*Travels*), in the election of their chiefs; the individual whose stomach was least susceptible to its deleterious effects was regarded as the "strongest of the party, and entitled to command the rest." In some parts of the country it is known as Crow Poison; corn saturated with a decoction of the root being scattered over the fields of new-planted Maize, these stupefy the crows if they feed upon them, to such a degree as to prevent their escape for some time. It has generally been asserted that the properties of the American are similar to those of the European plant, and judging from the analogy of the botanical and chemical characters of the two, this supposition would appear to be well founded; but the experiments and observations of Dr. Osgood and others show that such is not the case. He states that it never acts as a cathartic, and is perfectly certain in its operation, and is in all respects analogous to *Colchicum* in its powers, and ought to supersede it in practice.

Medical Uses.—Dr. Tully states that it is a deobstruent or alterative, an acrid narcotic, an emetic, an epispastic and an errhine. It has been found very useful in gout, rheumatism, diseases of the lungs, and some complaints of the bowels; and externally in the form of ointment in many cutaneous affections. From the evidence of Drs. Tully, Osgood, Ware and others, it is evident that it is a most important addition to the Materia Medica, and one that deserves the attention of the profession. The best forms of administration are the tincture and extract. The dose of the first is about thirty drops, and of the latter one-third of a grain, gradually increasing, until some effect is induced. (See Dr. Osgood's observations, *Am. Jour. Med. Sci.* 1835, and *Amer. Jour. Pharm.* N. S. i. 202.)

There are several other species of this genus found in this country, as *V. parviflorum* and *angustifolium*, which are probably active, and should be examined.

Colchicum.—*Linn.*

Perianth coloured, infundibuliform, with a long, subterranean slender tube, and a somewhat campanulate, 6-parted limb. Stamens 6, inserted on the throat of the tube. Ovary 3-celled; ovules numerous in 2—3 rows; styles 3, filiform, long; stigmas somewhat clavate. Capsule 3-celled, partible in 3, with an internal dehiscence. Seeds roundish, numerous, with a corrugated testa.

A small genus of bulbous-rooted herbaceous plants, found in Europe and Central Asia, the species of which have long been employed in medicine. They all appear to be active, and to be very analogous in their action. One only is officinal.

C. AUTUMNALE, *Linn.*—Corm ovate, solid, fleshy. Leaves dark green, smooth, obtuse, long, somewhat carinate, produced in the spring. Flowers several, radical, leafless, of a purple colour, with long whitish tube, appearing in the autumn. Capsules 3, distinct, but forming a single, oblong, elliptical fruit, with intermediate fissures. Seeds whitish, polished.

Linn. *Sp. Pl.* 485; *Eng. Bot.* 133; Stephenson and Churchill, ii. 70; Lindley, *Fl. Med.* 589.

Common Names.—Meadow Saffron; Naked Lady, &c.

Foreign Names.—Colchique; Tue chien, *Fr.*; Giglio matto, *It.*; Zeitlose, *Ger.*

Fig. 300.

C. autumnale.
1. Closed Capsule. 2. Open do. 3. Styles. 4. Section of Capsules. 5. Seed.

It is found in many parts of Europe, usually growing in meadows and low rich situations. The corm is in full perfection in June or July, when a new one makes its appearance at the base. This young corm flowers in the autumn, though then very small, but rapidly enlarges during the winter, and in the spring sends out leaves and the seed-vessel, which latter had remained under ground from the time of flowering. The older corm now becomes more and more spongy and watery, till the time of flowering, but retains its form and size until the succeeding spring, when it withers away, the corm to which it had given rise being now perfect, and this in turn undergoes the same changes. The corm is most active in July, and should be collected for use at that time. Dr. Lindley states that many of those found in the shops have been gathered during the flowering season, and hence are comparatively worthless. When obtained at the proper time, the corm is about the size of a small tulip root, which it much resembles, except that it is solid instead of being tunicated. It is rounded on one side, flattened on the other. Externally it is brown, the section being white, and contains an acrid milky juice. The odour is somewhat irritating, and the taste unpleasant, bitter and acrid. It is preserved by having the outer coat removed, and being cut in slices, which are to be dried quickly. Sometimes it is dried without being divided. The dried slices should be of an oval rounded form, with a notch on one side, of a grayish-white colour, an amylaceous appearance, and an acrid bitter taste.

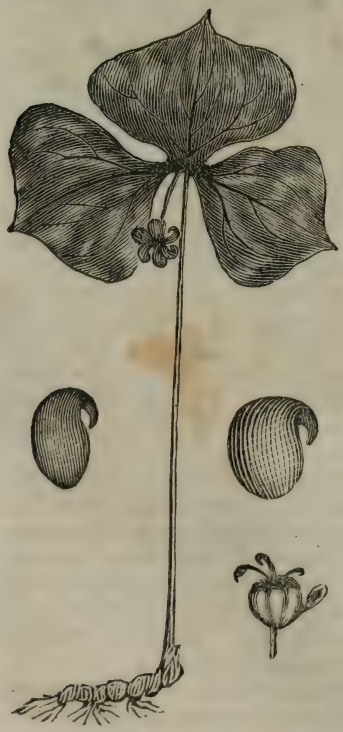
The seeds, which are likewise officinal, are small, rounded, of a brownish-yellow colour, and of the same taste as the corm. They should not be collected until fully ripe. According to the analysis of Pelletier and Caventou (*Jour. Pharm.* vi. 364), the corm contains Veratria in the form of a supergallate; Fatty matter united to a volatile acid; Yellow colouring matter, Gum, Inulin, &c. The seeds are said by Geiger and Hesse, to contain another extremely poisonous principle which they term *Colchicina*, differing from Veratria, in being soluble in water, and in not being acrid.

Colchicum was known to Dioscorides, and appears to have been employed in the earlier ages of medicine, but to have been forgotten for a long time; for although mentioned by Alexander of Trallus, in the sixth century, as a

remedy in gout, it does not appear to have been employed until again brought forward as a specific in the same disease, by Papagonius, in the thirteenth century, when it became highly popular, and received the name of "Anima articulorum." It was again neglected and almost forgotten, until the experiments of Störck, in 1763, assigned it its true rank in the Materia Medica, since which it has enjoyed more or less favour with the profession as a remedial agent in gout, rheumatism, &c.

Medical Uses.—Colchicum is an irritant, and in over-doses, an acro-narcotic poison. When administered in small and repeated quantities, it acts as a nauseant and cathartic, diuretic and diaphoretic, and at the same time exercises a sedative power in alleviating pain and irritation. It is principally employed in the treatment of gout and rheumatism, after the reduction of undue excitement by bloodletting and other evacuants. Some difference of opinion exists as regards its mode of action; many practitioners are of opinion that its beneficial influence is mainly owing to its purgative operations, and therefore combine it with some of the cathartics; others, again, strongly maintain, that where it operates on the bowels, no good results are obtained; and a few, among whom is Dr. Williams (*Princ. of Med.* 129), incline to the belief that gout and rheumatism are owing to an excess of uric acid and urea in the blood, which is obviated by the discharge of them under the influence of Colchicum. Be this as it may, it appears necessary in giving this remedy to administer it in full doses, until some of its marked effects display themselves, as nausea, vertigo, &c., when the doses may be diminished or wholly omitted. It has also been administered in many inflammatory and febrile affections as an auxiliary to bloodletting.

Fig. 301.



T. cernuum.

The root and seeds are given in substance in doses of two to eight or ten grains; in tincture, of which the medium dose is from half a drachm to a drachm; in the wine, in the same quantities, and in the vinegar in like manner.

Trillium.—*Linn.*

This genus does not properly belong to the Melanthaceæ, but as it is allied to this order, it has been noticed under this head, to avoid introducing a natural group of plants, of which it is the only one deserving of mention.

Sepals 3, herbaceous. Petals 3, coloured. Stigmas 3, sessile. Berry superior, 3-celled; cells many-seeded.

An extensive genus of North American herbaceous plants, with somewhat tuberous roots, having a faint, slightly terebinthinate odour, and a peculiar aromatic taste. When chewed they cause a flow of saliva, and a sensation of heat in the throat and fauces. Nothing is known of

their exact medicinal powers, but they were in use among the Indians, and are now much employed in empirical practice, and it is said, with some success. The species appear to act very similarly and are stated to be astringent, tonic, and alterative. They have been popularly prescribed in various hemorrhagic discharges, and were much esteemed by the Indians in those peculiar to the female sex. Externally they have been employed as a cataplasm to indolent tumours, ill-conditioned ulcers, &c. Riddell (*Synop. Fl. West. St.* 92) says that they are administered as a preparatory to parturition, and are known under the name of Birthwort. Lindley (*Fl. Med.* 588), on the authority of De Candolle, asserts that the roots are violently emetic, and the berries suspicious. These plants deserve the attention of the profession, for if they possess the virtues attributed to them, they are worthy of admission into the officinal lists of the Materia Medica.

Order 115.—LILIACEÆ.—*De Candolle.*

Flowers hermaphrodite. Calyx and corolla coloured alike, regular or nearly so, sometimes cohering into a tube. Stamens 6, inserted on the sepals and petals. Anthers introrse. Ovary free, 3-celled, many-seeded; style 1; stigma 3-lobed or simple; ovules anatropal or amphitropal. Fruit succulent, or dry and capsular, 3-celled. Seeds imbricated, in 1 to 2 rows.

A very extensive order of herbs, shrubs, or trees, with various kinds of roots. The leaves are usually narrow, with parallel veins, in a few cases expanded into a broad lamina with diverging veins, never articulated to the stem. There is much difference of opinion among the most eminent botanical authorities, with respect to the limits of this order, some dividing it into several of equal value, whilst others regard these groups merely as sections. This latter view has been adopted in the present instance, as the most convenient, for although the differences of structure in the various tribes are undoubtedly great, they have not been sufficiently studied, to ascertain their true value as foundations for distinct orders.

Tribe 1. Tulipeæ.

Erythronium.—*Linn.*

Segments of the perianth reflexed, each alternate one with 2 tubercles at base. Stamens 6, inserted on the base of perianth, shorter than the style. Style furrowed, triangular; stigma either 3-cornered, or with 3 spreading, channelled plates. Capsule turbinate-globose, erect, with the valves bearing the placentæ.

A small genus of herbaceous, bulbous-rooted plants, peculiar to Europe, Northern Asia, and North America, whose name is founded on the leaves being marked with red spots. They are of very little medicinal importance, but as one of them is officinal in the U. S. Pharmacopœia, they require a brief notice.

E. americanum, *Ker.*—Corm situated deep in the ground, brown externally, white within. Stem naked, slender. Leaves 2, nearly equal, lanceolate, veinless, of a dark brownish-green, shining, marked with irregular spots of dark-brown above. Flower solitary, drooping. Sepals and petals lanceolate, yellow; sepals often reddish on the outside; petals with an obscure tooth on each side near the base. Capsule oblong-obovate.

Fig. 302.

E. americanum.

Ker, *Bot. Mag.* 1113; Nuttall, *Gen.* i. 223; Bigelow, *Med. Bot.* iii. t. 58; Barton, *Fl. N. A.* t. 33; *E. dens canis*, Michaux, *Fl. Bor. Am.*; *E. lanceolatum*, Pursh, *Fl. Am. Sept.* i. 230.

Common Names. — Dog-tooth violet; Adder's tongue; Yellow Snowdrop, &c.

A native of most parts of the United States, growing in shaded and somewhat moist situations, flowering very early in the season. There are several varieties. The flowers are fully expanded and revolute during bright days, but in cloudy weather are nearly closed. The recent root has been spoken of as an emetic in doses of from twenty to thirty grains, but it is very uncertain in its operation, and is almost inert in a dried state. When cooked, these bulbs are bland and edible. The leaves are also stated to be active, and more certain in their effects than the roots, but neither of them are capable of supplying the place of Colchicum, as proposed by Dr. Bigelow. In domestic practice this plant, and the *E. albidum*, have attained some reputation as external applications to scrofulous sores, for which purpose the leaves and roots are boiled with milk and used as a cataplasm.

The bulbs of *E. dens canis* of Europe, are said by Pallas and Gmelin to be much employed in Siberia as articles of food, and in Styria, according to Clusius, they were formerly considered efficacious in epilepsy, and as an anthelmintic. In India the *E. indicum* is used by farriers in strangury of horses, and is even employed by physicians as a substitute for squills. (Ainslie, *Mat. Ind.* i. 402.)

Other plants of this tribe have been considered to possess medicinal properties. Thus, Lemery states that the bulbs of *Tulipa gesneriana* are useful in the form of cataplasms, as resolvents and maturants; and according to Poiret (*Encyclop. Method.*) those of *T. sylvestris* are emetic. The bulbs of *Calochortus elegans* are employed as food by the Indians of the West (*Pursh*,

i. 240). Those of *Fritillaria imperialis* are stated, by Orfila, to be an acrid poison (*Toxicol.* ii. 94). They enter into the composition of some ointments of the foreign Pharmacopœias. A decoction of the flowers of *F. meleagris* has been used in febrile affections, and its juice was at one time thought beneficial as an application to carcinomatous ulcers. Many species of *Lilium* afford edible bulbs, as *L. camtschasense*, *L. martagon*, *L. pomponium*, &c. That of *L. candidum* is also employed as food in some countries, and is likewise used in medicine as a maturating cataplasm. A fragrant oil is prepared from the petals, which has been thought beneficial in ear-ache and uterine pains. Its greatest employment is in perfumery. The root of *Gloriosa superba* is said to be a violent poison. According to Bowdich (*Travels*), when bruised, it is used in Guinea as an application to strains and bruises. The leaves are astringent.

Tribe 2. Hemerocalleæ.—Very few species belonging to this tribe have any active qualities, though some have been, from time to time, admitted as medicinal. The tubers of *Hemerocallis flava* are noticed by Dioscorides as forming an excellent cataplasm to painful tumours and burns. The flowers of *Funkia japonica* are said to be the basis of a liqueur, to which marked stimulating properties have been attributed. The roots of *Polianthes tuberosa* are acrid and emetic, and according to Lemery, detersive, resolvent, and astringent. From the fragrant flowers, a variety of essences and perfumes are prepared. The most important plant of this group is *Phormium tenax*, or New Zealand flax; this affords a fibre of great strength, exceeding that of hemp, and will, probably, become of much importance in the arts. Lesson, (*Voy. Med.*, 116,) states that the roots are bitter, and are employed in New Zealand to rub the nipples of nursing females, who wish to wean their children, and according to Dieffenbach, they are an excellent substitute for sarsaparilla, acting as a purgative, sudorific, and expectorant (*Chem. Gaz.* 1842). Several species of *Sanseviera* likewise afford a kind of hemp, which has appeared in commerce under the name of African hemp.

Fig. 303.

Phormium tenax.

Tribe 3. Aloineæ.—This section contains some plants of much reputation as medicinal agents, and a few of which, belonging to *Aloe*, are officinal.

Aloe.—*Linn.*

Perianth tubular, 6-cleft, fleshy, nectariferous at base; sepals resembling the petals, and closely covering them in an imbricate manner. Stamens hypogynous, as long as the perianth, or sometimes longer. Capsule membranous, scarious, 3-cornered, 3-celled, 3-valved, with a loculicidal dehiscence. Seeds numerous, two-ranked, roundish or angular.

Fig. 304.

Various species of Aloes.

A genus of succulent, mostly herbaceous plants, containing numerous species, differing from each other exceedingly in the size, form, and surface of their leaves and flowers, as well as in stature. They are natives of warm climates, but are not strictly tropical. Many of them, and especially the arborescent species, abound in an acrid bitter juice, which, when inspissated, forms the purgative known as Aloes. The different varieties of this drug are derived from several sources, but it is by no means satisfactorily ascertained to which species each of the kinds is to be referred. It is, however, highly probable, that the following furnish the largest proportion of the Aloes of commerce.

1. A. VULGARIS, *Lamarck.*—Stem simple, cylindrical, short. Leaves succulent, amplexicaul, lanceolate, glaucous-green, flat above, convex beneath, armed with distant reddish spines, perpendicular to the margin, somewhat mottled with a darker colour. Scape axillary, glaucous-reddish, branched. Spike cylindrical, ovate. Flowers yellow; at first erect, then spreading, finally pendulous; perianth not longer than the stamens.

Fig. 305.

A. socotrina.

Lamarck, *Encyc. Meth.* i. 86; Desfontaines, *Fl. Atlant.* i. 310; Lindley, *Fl. Med.* 594; *A. perfoliata var.* π. Linn., 458; *A. barbadensis*, Miller, *Gard. Dict.*

It is a native of the East Indies and the Barbary coast, but is now naturalized in the West Indies, as well as Italy, Spain, &c. It yields Barbadoes Aloes, and probably, some of the other kinds. *A. abyssinica*, Lamarck, is, perhaps, a variety of this species; and if not, is very closely allied to it in its botanical characters and the nature of its products.

2. A. SOCOTRINA, *Lamarck.*—Stems woody, straight, naked below, where it is strongly marked by the scars of former leaves. Leaves amplexicaul, ascending, ensiform, curved inwards at the extremity, concave above, convex below, with many small white serratures at the edge. Raceme cylindrical, not divided. Flowers scarlet at the base, pale in the middle, green at the apex. Stamens unequal, 3 of them longer than the flowers.

Lamarck, *Encyclop.* i. 85; De Candolle, *Pl. Grass.* 85; *Bot. Mag.* 472, 1474; Stephenson and Churchill, ii. 110; *A. perfoliata*, Linn., *Sp. Pl.* 458; *A. vera*, Miller, *Dict.*

A native of the island of Socotra, and probably, of the adjoining coasts. This

is said to furnish Socotrine aloes, but it is not satisfactorily ascertained that such is really the case.

3. A. SPICATA, *Thunberg.*—Stem woody. Leaves thick, fleshy, broad at base, gradually narrowed to the point, channelled, distantly-toothed, with sparse white spots. Spike a foot long, very compact, flowers campanulate, horizontal. Petals broad, ovate, obtuse; sepals narrower, less concave. Stamens longer than the perianth.

Thunberg, *Fl. Cap.* 309; Linn., *Suppl.* 205; Lindley, *Fl. Med.* 595.

Indigenous at the Cape of Good Hope, and one of the sources of Cape Aloes. This is also furnished by *A. purpurascens* (though according to T. Martius, it also yields Socotrine), by *A. arborescens*, *A. commelyni*, *A. mitriformis*, &c.

There are several other species, as *A. rubescens*, *A. linguæformis*, *A. arabica*, *A. indica*, &c., natives of the countries whence Aloes is imported, that may contribute to the production of the several varieties of this purgative.

The kinds of Aloes met with in commerce are numerous, though not more than two or three are usually found in our shops, and most usually but one—the Cape, which, when good, answers every purpose that is desired from it. The quality of aloes appears to depend, in a great measure, on the mode of its preparation. (For an account of the different modes, and the various kinds of Aloes, see *Pereira*, ii. 113, and *U. S. Dispensatory.*)

Aloes were well known to the ancients at the time of Dioscorides, but are not noticed by either Hippocrates or Theophrastus. They appear to have been in use in India and other parts of the East, from a very early period. All kinds have a disagreeable, permanent bitter taste. The odour is peculiar. They are almost wholly soluble in water, but the best solvent is diluted alcohol. They have, several times, been analyzed, but the results are not entirely satisfactory; but it has been shown that they contain from 50 to 80 per cent. of a bitter matter, called *Aloesin*, soluble in water, and a substance having some of the properties of a resin. The presence of an acid has likewise been demonstrated, which Pereira terms *Aloetic*.

Medical Uses.—The action of Aloes varies according to the dose. In small quantities, it seems to have the properties of a tonic, and in larger proportions to increase the peristaltic motions of the bowels. It exercises a stimulant action on the venous system of the abdominal viscera, and especially on those of the pelvis—hence the occurrence, or aggravation of hæmorrhoids from its habitual use, and its occasional emmenagogue influence.

Aloes are well calculated, especially in combination with soap, iron, &c., for torpid conditions of the lower bowels, in atonic dyspepsia. This remedy is likewise useful as an anthelmintic, in cases of Ascarides, to promote the menstrual discharge, to reproduce a hæmorrhoidal flux, &c. Aloes is usually given in pills, in doses of five to twenty grains. It enters as a constituent into a great number of useful compound remedies.

Tribe 4. ALLIEÆ.—Numerous species of this extensive tribe are highly important, not only for their medicinal, but also for their esculent properties. The bulbs of *Camassia esculenta* are much employed by the Western tribes of Indians as food, and are also said to form an excellent poultice for inflamed breasts in nursing women. Those of *Ornithogalum umbellatum* are edible and nutritive when cooked, and the young shoots of *O. pyreniacum* are used as a substitute for Asparagus in some parts of Europe. The stalks of *Albuca major* are mucilaginous and thought by the Hottentots to be very efficacious in assuaging thirst. *Muscari comosum* and *ambrosiacum* have been considered as stimulant and antispasmodic. T. Martius states that the

bulbs of *Ledebouria hyacinthoides* are employed as a substitute for Squills in the East Indies, and Ainslie says they are beneficial in strangury in horses.

Squilla.—*Steinheil.*

Sepals 3, coloured, spreading. Petals similar, a little broader. Stamens 6, shorter than the perianth; filaments smooth, somewhat dilated at base, acuminate, entire. Ovary 3-parted, glandular and melliferous at tip; style smooth, simple; stigma obscurely 3-lobed, papillose. Capsule rounded, 3-angled, 3-celled. Seeds numerous, in 2 rows, flat, with a membranous testa.

A small genus of bulbous-rooted plants, principally natives of Southern Europe, and mostly abounding in an acrid principle which is emetic. It was separated from *Scilla* by M. Steinheil on account of its winged seeds and the melliferous glands in the ovary.

S. maritima, *Steinheil*,—Bulb large, roundish-ovate. Leaves appearing after the flowers, broad-lanceolate, channelled, spreading, recurved. Scape long, terminated by a large, dense, ovate raceme. Flowers pale yellowish-green, with a green mark on the middle of each segment. Filaments shorter than the segments of the perianth.

Steinheil, *Ann. Sci. Nat. Ser.* vi. 279; Lindley, *Fl. Med.* 591; *Scilla maritima*, Linn., *Sp. Pl.* 442; Stephenson and Churchill, iii. 153; *Ornithogalum maritimum*, Lamarck, *Fl. Fr.* iii. 276.

Common Names.—Squill; Sea Onion.

Foreign Names.—Scille, *Fr.;* Ciopollo marino, *It.;* Mierswiebel, *Ger.*

The Squill is a native of the shores of the Mediterranean, &c., but is sometimes found far inland. It was well known to and used by the ancients, and was employed by Hippocrates externally, and as a pessary. Pythagoras, is stated by Pliny, to have written a dissertation on its virtues, and it is asserted to have been worshipped by the Egyptians, but it appears probable that the bulbous root, considered holy by them, was a variety of *S. pancration.*

The recent root, which is seldom brought to this country, is composed of thick, smooth scales, closely applied over each other, containing an acrid juice of a bitter taste. The dried Squills of the shops is in white or yellowish-white, somewhat semi-transparent pieces, which are flexible when moist, but brittle when dry, of a mucilaginous bitter taste, but scarcely any odour. From the recent analyses of the Squill, it is shown to contain an acrid Volatile matter, a peculiar principle called *Scillitin*, Tannin, Gum, &c. Scillitin is crystallizable, deliquescent, bitter, and alkaline, and in conjunction with the acrid matter is the efficient component.

Medical Uses.—Squill in small doses is expectorant and diuretic; in larger, emetic and cathartic, and in over-quantities acts like an irritant poison. To obtain its diuretic or expectorant action, the dose should be sufficiently large to occasion a slight degree of nausea. It has proved very beneficial in chronic catarrh, and, in the form of the compound syrup, of great use in croup. As a diuretic, it is usually given in combination with mercury and digitalis, or with both. The dose of the powder as an expectorant or diuretic is from one to three grains; of the syrup, half a drachm to a drachm, and of the compound Syrup, ten drops to a drachm.

Mr. Steinheil has described another species of *Squilla* under the name of *S. pancration*, which he thinks is the Pancration of Dioscorides, and the red-rooted variety of which is probably the bulb worshipped by the ancient Egyptians. *S. indica* is a species noticed by Roxburgh as having a bulb fully as nauseous and bitter as the officinal kind, and as probably possessed

of the same qualities. (*Fl. Ind.* i. 47.) *S. lilio-hyacinthus* is stated by De Candolle to have purgative bulbs.

Allium.—*Linn.*

Flowers umbellate, with a membranous spathe. Perianth 6-parted, permanent, equal. Stamens inserted on the base of the perianth; filaments either all similar, or the alternate ones tricuspidate; anthers incumbent. Ovary 3-celled; style subulate; stigma simple. Capsule usually obtusely 3-angled, or 3-lobed, depressed, 3-celled, bursting into 3 valves through the dissepiments, and containing 1—2 black seeds in each cell, affixed to the base. Embryo falcate, not in the axis.

An extensive genus of mostly European plants, but also found in Siberia, Northern Africa, and the United States. Several of them are alpine or sub-alpine. Many of them are imbued with a peculiar volatile principle, of a strong odour and somewhat acrid taste.

1. A. sativum, *Linn.*—Bulbs clustered, proliferous. Stem leafy below the middle. Leaves acute, distichous, glaucous, channelled above. Spathe calyptriform, connected. Umbels bulbiferous. Flowers, when present, of a pink, red, or whitish colour, with the perianth rather longer than the stamens.

Linn., *Sp. Pl.* 425; De Candolle, *Fl. Fr.* iii. 219; Stephenson and Churchill, ii. 111; Lindley, *Fl. Med.* 593.

Common Name.—Garlic.

Foreign Names.—Ail, *Fr.;* Gartenlauch, *Ger.;* Allio domestico, *It.*

It is not certain where the Garlic is native, but it is extensively naturalized in the South of Europe, Egypt, &c. From its having been known at a very early period, it is probable that it is originally from some part of Asia. It was one of the plants worshipped by the Egyptians, but was held in abhorrence by the Greeks, though it was employed medicinally by them.

Every part of it has a strong and unpleasant odour, and a pungent acrid taste, owing to the presence of a Volatile oil. The crushed bulbs applied to the skin, produce irritation and rubefaction. Internally, this article somewhat resembles Squill in its action, being diuretic, diaphoretic, and expectorant. It is occasionally employed in regular practice, as an expectorant in the form of the syrup, or externally as a counter-irritant. In domestic medicine it is resorted to to fulfil a variety of indications. It is, however, more employed as a condiment than as a remedial agent.

The *A. cepa*, or Onion, has analogous properties, but is milder. Roasted and divided it is sometimes applied as an emollient poultice to suppurating tumours. The other species in common use are *A. porrum* or Leek, *A. schœnoprasum* or Chives, *A. ascalonicum* or Shallot; *A. scodoprasum* or Rocambole. It may be noticed that Dr. Paris asserts, that the best corrective of the unpleasant flavour of this tribe of vegetables, is found in the aromatic species of the Apiaceæ, but that any of the aromatics mitigates and corrects their acrimony; this was known to Virgil, "Allia, Serpyllumque, herbas contundit olentes." (*Eclog.* ii. 11.) Menander also says that the beet root when baked wholly removes the odour of Garlic.

The acrid bulbs of our native *A. canadense* have been employed as a substitute for the cultivated garlic, and appear to be fully as efficient.

Tribe 5, Conantheræ.—Little is known of the properties of the plants of this tribe, but it is probable that they are not of a marked character. Ruiz and Pavon state that in Chili the natives use the bulbs of *Conanthera bifolia* as food, both in a raw and cooked state (*Flor. Peruv.* iii. 8).

Tribe 6, Anthericeæ.—The species of this group are of more medicinal

importance, though none of them are officinal. The bulbs of *Asphodelus ramosus* were employed by Hippocrates in the treatment of ulcers, and are noticed as remedial by Dioscorides and Pliny. They have been recommended in more modern times as beneficial in itch. The roots of *Anthericum bicolor*, are employed in some parts of France as a purgative, and those of *Narthecium ossifragum* were considered to possess the power of softening the bones. *Herreria salsaparilha*, of Brazil, is used in that country as a substitute for Sarsaparilla, and is said to have all the properties of that article, (*Martius.*)

Fig. 306.

A B

B. Xanthorrhœa hastilis. A. Kingia australis.

Tribe 7, APHYLLANTHEÆ.—The only plants of this order that have attracted notice for valuable qualities are different species of *Xanthorrhœa*. The leaves of several of these afford valuable food for cattle in Australia, and the lower and succulent portions of them are said to form a pleasant esculent, having a milky and somewhat balsamic taste. *X. arborea* furnishes a fragrant, brownish-yellow resin, called Botany Bay gum, which, whilst burning, diffuses an odour of Benzoin; a tincture of this is said to be a good astringent in bowel complaints, and has been noticed with some praise by Sir Gilbert Blane, and also by Dr. Fish (*Bost. Med. Jour.* x.)

Tribe 8, WACHENDORFEÆ.—Nothing satisfactory has been ascertained respecting the qualities of the species of this group.

Tribe 9, ASPARAGEÆ.—The roots of *Dianella odorata* are very fragrant, and are stated by Blume to be employed in Java in gonorrhœa, leucorrhœa, and dysuria. Those of *Asparagus* are diuretic, and communicate a peculiar odour to the urine. The young shoots or turiones of the *A. officinalis* are well known as a delicate, spring culinary vegetable, and the juice, and a syrup made from it, have been thought to exercise a marked power in repressing an undue excitement of the circulatory system, and hence deemed useful in hypertrophy of the heart, &c., but the evidence on this point is far from satisfactory. They contain a peculiar principle called *Asparagin* or *Asparamide*. In India, the roots of *A. sarmentosus* are popularly supposed to diminish the eruption in small-pox, to prevent it from becoming confluent. *A. acutifolius* was used as a culinary vegetable by the ancients, and is said to contain more Asparagin than the cultivated species. The roots of *A. ra-*

cemosus and *adscendens* are said by Royle to be employed medicinally in Northern India, and that those of the latter, which are conical and semi-transparent are considered a good substitute for salep. The flowers of *Cordyline reflexa* are said to be emmenagogue, and *C. terminalis*, or Ti plant of the South Sea Islands, is a very important article of diet. By baking its large, woody roots, they become sweet and nutritious; when they are bruised and mixed with water, fermentation ensues, and an intoxicating beverage is produced, and on distillation, an ardent spirit is afforded (*Bot. Reg.* i. 1749). *C. ferrea* is said to have astringent roots, which have been found beneficial in dysentery.

Fig. 307.

Cordyline terminalis.

The various species of *Ruscus* were once celebrated as aperients and diuretics, on account of their bitter, sub-acrid, mucilaginous roots, and more especially *R. aculeatus*, or Butcher's broom, the properties of which were known to Dioscorides and Pliny; it is still employed in some parts of Europe in diseases of the urinary organs and dropsy. *R. hypophyllum* was also at one time much esteemed as an emmenagogue. The seeds of all of them are hard and horny, and are said to be a pleasant substitute for coffee. The roots of many species of *Polygonatum* have been popularly employed both in Europe and this country as demulcents and vulneraries. They are all mucilaginous, and when cooked, bland and nutritive. Schœpf says the bruised root forms a good cataplasm in ophthalmia, and Clayton is of opinion that the berries are useful stimulants to the stomach in sick headache. The turiones form one of the best substitutes for Asparagus. *Dracæna draco*, a native of the Canary Islands and the East Indies, attains an enormous size. An individual of it growing at Orotava has long been celebrated for its great bulk and age, being 45 feet in circumference, and has been known since 1402. Humboldt remarks that it is one of the oldest inhabitants of our globe. This species affords one of the varieties of Dragon's blood.

Fig. 308.

Dracæna draco.

The other tribes of this order do not require notice, as they contain no species employed in medicine, or useful in the arts.

Group L.—Smilicales.

Order 116.—SMILACEÆ.—*Lindley.*

Flowers perfect, monœcious, dicœcious or polygamous. Calyx and corolla very similar, free, 6-parted. Stamens 6, inserted on the perianth near the base, seldom hypogynous. Ovary 3-celled; cells 1—many-seeded; style usually trifid; stigmas 3; ovules orthotropal. Fruit a roundish berry. Albumen between fleshy and cartilaginous; embryo very small, distant from the hilum.

They are all herbaceous plants, or under-shrubs, sometimes climbing and often having fleshy tubers. The stems are scarcely woody, and the leaves are reticulated. This order, and the next, present some important differences from the true Endogens in having reticulated leaves and somewhat Exogenous rhizomes, and with a few other groups, have been erected by Lindley into a separate class under the name of DICTYOGENS, but which requires more study and investigation before it can be admitted. From the near affinity in many respects, to the *Liliaceæ*, I have preferred placing those orders as a sequence to that group, rather than to introduce them between the Exogens and Endogens.

The species are found in most parts of the world, but are most common in the tropical and temperate parts of Asia and America. Several of them furnish the Sarsaparilla of the shops, but much uncertainty prevails as to which is the true officinal one. Dr. Hancock states that the Sarsaparilla of the Rio Negro, which is imported from Angustura or Para, is the best, and certainly is not the product of *S. siphilitica*, as it has not the axillary spines of that species, but Pereira is of opinion that this assertion is not to be implicitly adopted, until further observations confirm its validity, more especially as in the same packages of the drug some stems are prickly and some devoid of these appendages, and yet perfectly similar in all other respects. The following species have been noticed.

1. S. SARSAPARILLA, *Linn.*—Prickly; leaves unarmed, ovate, lanceolate, cuspidate, sub-5-nerved, somewhat glaucous beneath; common peduncle longer than the petiole.

Linn., *Sp. Pl.* 1459; Barton, *Fl. Phil. Prod.* ii. 195; *S. glauca*, Michaux, *Fl. Am. Bor.* ii. 237.

This native species was at one time considered to afford the Sarsaparilla of commerce, but there is not a shadow of evidence that such was the case. It is probable, at the same time, that it has some of the qualities of the officinal article.

2. S. MEDICA, *Schlechtendal.*—Stem angular, armed with straight prickles at the joints, and a few hooked ones in the intervals. Leaves chartaceous, bright-green on either side, smooth, cordate, auriculate, shortly acuminate, 5-nerved, with the veins on the lower surface prominent; their form is variable. Peduncles varying in length, with umbels of about 12 flowers on short pedicels.

Schlechtendal, *Linnæa*, vi. 47; Lindley, *Fl. Med.* 598.

This is a native of Mexico, and there can be no doubt is the plant furnishing the "Vera Cruz Sarsaparilla." Schiede found it on the eastern slope of the Mexican Andes, and states that he was informed, that the roots were gathered during every part of the year, dried in the sun, and then packed for sale. (Lindley, *Flor. Med.* 598, from *Linnæa*, iv. 576.)

3. S. SIPHILITICA, *Willdenow.*—Stem round, smooth, with a few short, thick, straight prickles at the joints. Leaves large, oblong-lanceolate, coriaceous, shining, acuminate, 3-nerved, terminated by a long point.

Willdenow, *Sp. Pl.* iv. 780; Kunth, *Nov. Gen.* i. 271; Lindley, *Fl. Med.* 598.

Found in the woods of tropical America, and is said by Pereira to yield the "Brazilian Sarsaparilla."

4. S. OFFICINALIS, *Kunth.*—Stem twining, angular, prickly or smooth; the young shoots destitute of armature. Leaves ovate-oblong, acute, cordate, reticulated, 5—7-nerved,

coriaceous, smooth; the young ones lanceolate, oblong, acuminate, 3-nerved. Petioles smooth, with 2 tendrils above the base. Flowers and fruit unknown.

Kunth, *Nov. Gen.* i. 271; Lindley, *Fl. Med.* 599.

A native of Colombia, on the banks of the Magdalena. It is called *Sarzaparilla* by the natives, by whom it is collected and sent to Carthagena and Mompox, whence it is shipped to Europe and this country. Pereira is of opinion that it is the source of "Jamaica" and perhaps of "Honduras and Lima Sarsaparilla."

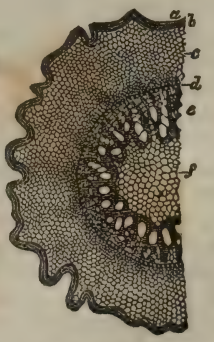
As before stated, Dr. Hancock says of the many species of Smilax he observed growing in Guiana, one only has the qualities of the genuine officinal article; this he describes as follows: "The stem is round, armed with short curved spines; the leaves are oblong, pointed, distant, smooth and glossy; the root is a tuber, with numerous divergent fibres of two or three lines in thickness, and several in length." From the want of axillary spines, he is of opinion that it is not the *S. siphilitica*, but, as has been shown by Dr. Pereira, this does not seem to be a valid objection. Royle seems to think that it may be the *S. papyracea* (Poiret), which is the *S. siphilitica*, Martius, non Humboldt. The root of this is stated to have all the sensible properties of the best Sarsaparilla. The other species said to afford this article, are *S. japicanga*, *S. brasiliensis*, *S. cumanensis*, *S. cordato-ovata*, and *S. purhampuy*, which latter Dr. Lindley thinks may be the same as *S. officinalis*.

As found in commerce, Sarsaparilla is made up into bundles more or less spirally folded, having smaller radicles attached, and sometimes portions of the rhizome and stem. The roots are some feet in length, about as thick as a quill, longitudinally wrinkled, of a red, brown or grayish colour; somewhat brittle, with oftentimes an amylaceous fracture. Their odour is somewhat argillaceous, and their taste at first mucilaginous, but finally becoming acrid. There are several varieties recognised, as the Jamaica, the Brazilian, the Lima, the Honduras, and the Vera Cruz. The principal kind in our market is the Honduras, or at least an article known under that name, though it does not answer in all respects to the description of that variety by Pereira and others. The Jamaica, which originally is a product of Honduras, and is much prized in England, probably comes to this market, but is not known under that name. Pereira gives the subjoined representations of magnified sections of these two varieties, which show that their internal organization differs in many particulars.

Fig. 309.

Jamaica Sarsaparilla.

Fig. 310.



Honduras Sarsaparilla.

a Cuticle. *b* Subcuticular tissue. *c* Hexagonal cellular tissue. *d* Cellular ring. *e* Woody zone. *f* Medulla. The hexagonal cellular tissue abounds in starch.

It is difficult to lay down any rules for judging of Sarsaparilla. Dr. Hancock is of opinion that the only criterion is the taste, and that the more acrid and nauseous this is, the better is the quality of the root. Others have judged by the quantity of extract that is yielded, and some again rely on the proportional quantity of beard or root fibres present, deeming that with the most to be the best. Sarsaparilla contains a bitter principle called *Smilacine*, Volatile oil, Resin, Starch, &c. Smilacine is very analogous if not identical with Saponin, and is probably the active principle, though this is by no means certain.

Sarsaparilla was made known to the Spaniards by the Indians, and was first introduced into Europe as an anti-venereal remedy about the middle of the 16th century, and became very popular, but soon fell into disrepute, and was almost forgotten, until again brought forward by Dr. William Hunter, Sir William Fordyce, and others, about a century since, as an adjuvant to mercury in the cure of syphilis. It is now in very general use, not only in this disease, but in most obstinate cutaneous affections, depraved conditions of the system, &c. But the opinion of the profession is by no means in unison as to its real powers; for whilst some hold that it exercises a real influence over a variety of disordered states of the constitution, others maintain that it is no more active than any other solution of gum and starch. There can be no doubt that under its use, the constitution has been improved and invigorated, and many obstinate affections have disappeared, though in every case its ultimate effects are far more evident than its mode of action. It is usually given in infusion, decoction, syrup, or extract. (See Pereira, ii. 131, *et. seq.*)

Numerous other species have been employed, among which may be mentioned *S. glauca*, the root of which is spoken of by Martius (*Travels*, ii. 96), as highly prized in Brazil, under the name of *China branca*, as a specific in syphilis, and also as very beneficial in gout and chronic cutaneous eruptions; but, to be effectual, the patient must take as much of the infusion as he can bear. The root of *S. china*, is one of the *China* roots of the older pharmaceutists, and still employed in some parts of Europe. This was recommended as a substitute for Sarsaparilla, and has the same properties. According to Dujardin, the roots form an article of food in China. *S. pseudo-China*, a native of the southern parts of the United States, and in Jamaica: this is said to be an excellent alterative; and, according to Elliott, (*Sketches*, ii. 700,) is used by the negroes in South Carolina, with molasses, sassafras, and Indian corn, in the manufacture of a very pleasant beer. *S. glabra*, of India, is said, by Roxburgh, (*Fl. Ind.* iii. 792,) to have a root closely resembling the China root. It is used in Sylhet as a depurative and alterative, as are also those of *S. lucumæfolia*; and the juice is likewise esteemed beneficial in rheumatic pains. The root of *S. glycyphylla*, or the Sweet Tea of Australia, is said to be fully equal to the best Sarsaparilla, and the leaves afford a sweet and bitter decoction, which is said to be eminently tonic and astringent.

Various Asiatic species, as the *S. zeylanica*, *S. perfoliata*, and *S. leucophylla*, are reported to be fully equal to the American kinds. *S. aspera* and *S. excelsa*, common in Turkey, are often substituted for the officinal article, and are stated to be sometimes found in the European drug market, under the name of Italian Sarsaparilla. Among our native kinds, *S. caduca*, *S. laurifolia*, and *S. tamnoides*, afford a kind of fecula, which was used by the Indians, but they principally employed the roots of *S. pseudo-China*, already spoken of. It should be noticed that the East Indian Sarsaparilla, which has been attributed to *S. aspera*, is derived from a wholly different plant, the *Hemidesmus indicus* (q. v.)

Order 117.—DIOSCOREACEÆ.—*Lindley.*

Flowers diœcious. Calyx and corolla alike, herbaceous. Sterile flowers: stamens 6, inserted on base of perianth, anthers introrse, with a longitudinal dehiscence. Fertile flowers: ovary adherent, 3-celled, with the cells 1—2-seeded; styles deeply trifid; stigmas undivided; ovules suspended, anatropal. Fruit leafy, compressed, with 2 of the cells often abortive; sometimes succulent. Seeds 2 in each cell, or by abortion 1, compressed, winged or wingless; embryo small, in a large cavity of cartilaginous albumen.

These are twining shrubs, often with large tubers, and alternate, occasionally opposite leaves, having reticulated veins. The flowers are small and bracteate. It is not a very extensive order, of principally tropical species, many of which have acrid roots, whilst in others this part is farinaceous and nutritive. That of *Tamus communis*, or Black Bryony, is active, and was formerly employed, in a bruised state, as a stimulating poultice, and as an application to contusions, to promote the absorption of coagulated blood. It was also administered, in small doses, as a diuretic. The young shoots, however, are eaten by the Arabs when in a raw state, and Matthiolus states that they were sold in Italy as a substitute for asparagus (*Comment. on Dioscor.* 467). Those of *T. cretica* are used in the same way in Greece, but Endlicher observes that except they are well boiled, they are eminently purgative and even emetic. Some species of *Dioscorea* have very acrid tubers; thus those of *D. triphylla* and *D. dæmona* are excessively nauseous even after being cooked; on the other hand, in many of them this is bland and edible, and is known under the name of Yam. Those most generally cultivated are, *D. alata*, in the East and West Indies; *D. bulbifera* in Tahiti and the Moluccas; *D. japonica*, in Japan; and there is a species in Congo, which is said to be so acrid, as to require to be boiled for four days to render it edible. One of our native species, the *D. villosa*, or Wild Yam, has a woody and contorted root, which, according to Riddell (*Synop. Flor. West. St.* 93), is possessed of valuable medical properties. He states that a decoction of it is eminently beneficial in bilious colic. This is made with an ounce of the root in a pint of water, of which half is to be administered at a time. He adds that it acts with great promptitude, and that he has been informed that Dr. Neville places much reliance on the tincture as an expectorant, and also that it acts as a diaphoretic, and in large doses as an emetic.

Fig. 311.

D. alata.

Group LI.—Glumales.

Order 118.—GRAMINACEÆ.—*Lindley.*

Flowers usually perfect, sometimes monœcious or polygamous; consisting of imbricated bracts, of which the most exterior are called glumes; the central enclosing the stamens, paleæ; and the internal at the base of the ovary, scales. Glumes mostly 2, alternate; sometimes single, usually unequal. Paleæ 2, alternate; the exterior or lower, simple, the upper or interior composed of 2 united by their contiguous margins, and ge-

nerally with 2 keels, so as to form a kind of calyx. Scales 2—3, sometimes obsolete; if 2, collateral, alternate with the paleæ and adjoining the lower of them; either distinct or united. Stamens hypogynous 1, 2, 3, 4, 6, or more, one of which is alternate with the scales; anthers versatile. Ovary simple; styles 2—3, rarely combined into one; stigmas feathery or hairy; ovule ascending, anatropal. Pericarp usually blended with seed, membranous. Albumen farinaceous.

A vast and most important order of herbaceous plants, sometimes with culms of a large size and perennial. The rhizome is fibrous or bulbous. The culm or stem is usually cylindrical, fistulous and closed at the joints. The epidermis is coated with a thin layer of siliceous matter. The leaves are narrow and undivided, alternate, with a cleft sheath, and a membranous ligula at their junction with the stalk. The flowers are in spikes. The species are found in all parts of the world, and in all situations. Their value to man, as affording the main part of his vegetable food, is inestimable, and their importance as fodder for cattle is second only to it. It is a curious fact that the native country of the principal Cerealia should be unknown; for, although oats and barley have been found apparently in a wild state on the banks of the Euphrates, they might have been only the remains of cultivation. Some writers have even supposed that these plants are the product of cultivation. (See *Gardiner's Chronicle*, 1844.) The order has been divided into numerous tribes, which will be separately noticed.

Tribe 1. Oryzeæ.—The most important genus of this group is *Oryza*.

Oryza.—*Linn.*

Glumes 2, 1-flowered. Paleæ 2, subequal, adhering to ovary. Stamens 6. Styles 2.

This genus appears to consist of but one species, though there are almost innumerable varieties, some of which differ much from each other. In Moon's Catalogue of Ceylon plants, he mentions 163 kinds of Rice, as grown in that island alone. Rice is cultivated in warm latitudes, and in some parts of Asia constitutes the chief food of the inhabitants. In a medicinal point of view, it may be considered as less aperient than any other grain, and is therefore well calculated as a diet where there is too much action of the bowels. In India, the Hindoo practitioners are very particular as to the variety they prescribe; deeming the rices of different crops to possess different qualities. That of the first, they say, is strengthening and wholesome, whilst that of the last will induce indigestion, flatulency, cutaneous eruptions, &c. Dr. Tytler (*Lancet*, 1834) is of opinion that the *oose* or damaged rice of India was the cause of the epidemic cholera; but this assertion has been shown to be erroneous, as is also another, more generally believed, that a continued use of this grain will occasion blindness.

The *Zizania aquatica*, or Wild Rice of this country, affords an excellent grain, somewhat resembling rice, which was in very general use among the Indians, especially of those tribes living in the vicinity of the great lakes.

Tribe 2. Phalareæ.

Zea.—*Linn.*

Monœcious. Sterile flowers: glumes 2, awnless, 2-flowered; paleæ awnless. Fertile flowers: glumes 2; paleæ 2; style 1, filiform, pendulous. Seeds immersed in an oblong receptacle.

This most useful genus is constituted of but one species, but the varieties are exceedingly numerous. It is universally cultivated in the United States, and in fact in most parts of America, and also in the southern countries of

Europe, and partially in Asia. In America, especially in the warmer portions, it forms the main article of food. Indian Corn or Maize differs from the other Cerealia in containing no gluten, and hence the meal does not undergo the fermentation called "rising;" but it is extremely wholesome and nutritious, and is employed in a variety of forms in this country. The young ears, when boiled, are much used as a vegetable, and are in general very digestible, but should be eaten with caution by those predisposed to, or suffering from disease of the bowels. In northern Italy, where this corn is much used, and forms the main nourishment of the inhabitants, it has been supposed that it is the cause of a peculiar cutaneous affection, called "pellagra;" but such can scarcely be the case, as the disease is unknown in this country, where Maize is so generally employed. (See Dunglison, *Human Health*, 251.)

Fig. 312.

Z. mays.

The hard seeds of *Coix lachryma*, well known as Job's Tears, have been supposed to be diuretic, and have also formed an article of food during times of scarcity in Spain and Portugal. The grain of *Phalaris canariensis*, or Canary Grass, is well known as the favourite food of the hard-billed cage-birds; and the meal is said by Marcel de Serres to form an excellent cataplasm, as it retains moisture for a longer period than any other article of the kind. It also makes an excellent and tenacious paste. One of the most important genera of this tribe is *Holcus*, so many species of which bear nutritive grains, much used in warm countries as a substitute for wheat. They are usually known under the name of Millet; thus the *H. bicolor* is cultivated in Persia; the *H. cafrorum* at the Cape of Good Hope; the *H. saccharatus* and *H. sorghum* in Africa and Italy. This latter species forms the principal food of the Arabs and the Fellahs of Egypt, by whom it is termed *doura*.

Fig. 313.

Panicum miliaceum.

Tribe 3. Paniceæ.—This large tribe contains few plants of much importance, except as fodder for cattle. *Panicum miliaceum* and *P. pilosum*, however, afford kinds of Millet, and are cultivated in India and Italy, as is also the *Setaria italica*, or Italian Millet. A fine-grained corn is also used on the west coast of Africa, which is the product of *Paspalum exile*. A Surinam species of this genus, *P. ciliatum*, is said by Rottböll to be beneficial in jaundice; and a variety of *P. frumentaceum*, of India, is stated to occasion vertigo and other unpleasant cerebral affections (*Mem. du Mus.* vi. 320). *P. scrobiculatum*, of India, is said to render the milk of cows narcotic and drastic.

Tribe 4. Stipeæ, and 5. Agrosteæ, require no notice, as their species are unimportant, both in medicine and as articles of human food.

Tribe 6. Arundineæ, is more interesting. Thus some of the Brazilian species of *Gynerium* are diuretic. A decoction of the root of *G. parviflorum* is used as a wash to strengthen the hair; and the stalk of *G. saccharoides* affords much sugar. In Russia, *Phragmites calamagrostis* is considered diuretic; *P. arundinacea* has the same properties. The roots of *Donax arundinaceus*, of Southern Europe, have been employed in decoction to lessen the secretion of milk in nurses, and are also recommended as astringent. *Arundo arenaria* is of great utility for keeping together the shifting sands of the seacoast, by means of its creeping suckers and tough, entangled roots.

Tribe 7. Pappophoreæ, and 8. Chloreæ, present nothing requiring notice.

Tribe 9. Aveneæ contains several species of importance in many respects. Thus *Anthoxantum odoratum* is very odorous, and is said to contain benzoic acid. *Ataxia horsfieldii* possesses the same fragrance. Belonging to this tribe is *Avena*.

Avena.—*Linn.*

Spikelets 3, many-flowered; flowers remote, the upper one withered. Glumes 2, thin, membranaceous, awnless. Paleæ 2, herbaceous; lower one awned on the back, awn twisted, almost bicuspidate at tip; upper one bicarinate, awnless. Stamens 3. Ovary hairy at point. Stigmas 2, sessile, distant, villous-plumose; hairs simple. Scales 2, smooth, large, usually 2-cleft. Caryopsis long, somewhat terete, marked within by a longitudinal furrow, hairy at tip, covered by the paleæ, adhering to the upper one.

Fig. 314.

A. sativa.

A. sativa, *Linn.*—Panicle equal. Spikelets 2-flowered. Florets smaller than the glumes, naked at the base, alternately awned. Root fibrous, annual.

Linn., *Sp. Pl.* 61; Willdenow, *Sp. Pl.* i. 446.

Common Name.—Oats.

Foreign Names.—Avoine, *Fr.*; Avena, *It.*; Haber, *Ger.*

The Oat was known to the Greeks, and is mentioned by many of their authors. Its native country is not known; but it has been naturalized in Sicily, and is said to have been found by Anson in the Island of Juan Fernandez. It is principally cultivated as food for horses, but also forms a large portion of the nutriment of man in many places, as in the north of England and of Scotland, in some parts of France, &c. The meal is nutritious and somewhat laxative, and easily digestible, and therefore is an excellent diet for the invalid in many cases. It is usually given in the form of gruel, made with more or less of the meal, according to circumstances, and sweetened or flavoured as may be required. A cataplasm of this meal with linseed flour, is a good emollient application to painful or suppurating tumours.

Tribe 10. Festucæ is very extensive, and possesses several plants of considerable interest to the medical botanist.

Bromus mollis is stated by Pereira (i. 122), on the authority of Loudon, to occasion vertigo in the human species and quadrupeds, and is fatal to poultry. *B. catharticus*, of Chili, is said by Feuillée to be purgative in decoction (*Chili*, ii. 705); but Pereira is of opinion that there may be some mistake in this, as *B. secalinus*, also reported to be active, has been found by M. Cordier to be bland. The plant noticed by Frazier as growing near Lima,

resembling a grass, and known under the name of *Carapullo*, a decoction of which causes delirium for some days, may, perhaps, belong to this tribe, though Lindley (*Fl. Med.* 613) seems to incline to the belief that it is a *Physalis*, and appertaining to the *Solanaceæ*. The native *B. purgans* is stated to be emetic, anthelmintic, &c.; but there is no definite evidence on the subject. According to Humboldt, *Festuca quadridentata* is very poisonous, and even fatal to animals. The seeds of *F. fluitans* are wholesome, and are eaten in Prussia; and the *teff*, or bread of Abyssinia, is made from those of *Poa abyssinica* and *Eleusine tocusso*. The various species of *Arundinaria* and *Bambusa* are used for a vast number of purposes in their native countries. A curious siliceous concretion is found in the Bamboo, near the joints; this is called *Tabasheer*, and is much esteemed by the Hindoos as a medicine, being considered as a powerful tonic, and is also prized in Persia for its cardiac and invigorating properties (*Ainslie*, i. 420). It, however, appears nothing but almost pure silex (see *Brewster's Journal*, viii. 268). A coarse, soft paper, is manufactured in the East Indies from the tissue of the Bamboo, and the young shoots are eaten like asparagus.

Tribe 11. Hordeæ.—This is by far the most important of groups, as it contains the larger proportion of the Cerealia usually cultivated.

Triticum.—*Linn.*

Spikelets three, many-flowered; the rachis usually articulated. Flowers distichous. Glumes two, nearly opposite, almost equal, awned or awnless. Paleæ two, herbaceous; the lower one awnless, mucronate or aristate at tip; the upper bicarinate, with the keels more or less aculeate. Stamens three. Ovary pyriform, hairy at the point. Stigmas two, sub-sessile, plumose, with long, simple finely-dentated hairs. Scales two, usually entire and ciliated. Caryopsis externally convex, and having a deep furrow distinct or adherent to the paleæ.

There are several species, and numerous varieties of this genus cultivated under the name of Wheat, the most common of which is the following:

T. vulgare, *Linn.*—Spike 4-crowned, imbricated, with a tough rachis. Spikelets usually 4-flowered. Glumes ventricose, ovate, truncate, mucronate, compressed below the apex, round and convex at the back, with a prominent nervure. Grains loose.

Villars, *Delph.* ii. 153; Kunth, *Gramin.* 438; Lindley, *Fl. Med.* 610; *T. hybernum et æstivum*, Linn. *Sp. Pl.* 126.

Common Name.—Wheat.

Foreign Names.—Blé, *Fr.*; Civitella, *It.*; Weizen, *Ger.*

This species is said to be native in the country of the Baschkirs; but this requires confirmation. It appears to have been cultivated at a very early age, and is noticed by the most ancient authors. There are two marked varieties, which were considered as species by Linnæus and many other botanists; these are the *hybernum*, or Winter Wheat, with almost awnless glumes, and the *æstivum*, or Summer Wheat, having long awns. Lamarck was of opinion that *T. turgidum*, or Egyptian Wheat, *T. spelta*, or Spelt, *T. durum*, *T. compositum*, *T. zea*, &c., are likewise mere varieties; but most authorities are against this view of the subject. Wheat differs from Barley and Oats in the perianth not being adherent to the grain.

It would be needless to dilate on the importance and uses of this grain, and its superiority to all others in the manufacture of bread. It is employed in medicine in the form of starch for a variety of purposes, in the form of bread in cataplasms, &c.

The creeping roots of some species, as *T. repens*, *T. glaucum*, and *T. junceum*, have some reputation as substitutes for Sarsaparilla; the first of these is much used in France, in decoction, as an emollient, diuretic, &c., and in the hospitals forms the basis of the common *tisane* in every complaint. It has been stated that a strong decoction of it has proved highly efficacious in organic diseases of the thorax and stomach.

Hordeum.—*Linn.*

Spikelets three, the lateral ones usually withered, 2-flowered, with an intermediate, abortive floret. Glumes two, lanceolate-linear, with subulate awns, flattish, unequilateral, at right angles with the paleæ, nearly on the outer side, herbaceous, rigid. Paleæ two, herbaceous; the lower one concave, awned; the upper bicarinate. Stamens three. Ovary hairy at tip. Stigmas two, sessile, plumose. Scales two, entire, or with a lateral lobe, usually hairy or ciliated. Caryopsis hairy at apex, oblong, furrowed within, rarely naked, adhering to the paleæ.

Several species of this genus are cultivated under the name of Barley; they differ from each other in the number of rows of the seeds, and in the presence or absence of awns; the grain appearing to be very similar in all of them.

Fig. 315.

H. distichon.

Fig. 316.

H. vulgare.

Fig. 317.

H. hexastichon.

H. vulgare, *Linn.*—All the florets hermaphrodite and awned. Seeds arranged in four rows. Stems erect. Scales fringed with hairs.

Linn., *Sp. Pl.* 125; Kunth, *Agrost.* 455; Lindley, *Fl. Med.* 610.
Common Names.—Barley; Spring Barley.
Foreign Name.—Orge, *Fr.*

This and the other species are thought to be natives of Central Asia, but there is no certainty on the subject, as it is also stated that they are indigenous to Sicily. The principal use of Barley is in the manufacture of malt liquors, for which purpose it is converted into *Malt* by forcing it to germinate by warmth and moisture, and destroying the vitality of the seed by heat. By this process the sugar is increased at the expense of the starch. It is also largely employed in southern Europe and Asia as food for horses. Barley is somewhat acrid and laxative, but when deprived of its husk (Pearl Barley) it is merely emollient and demulcent, and is easy of digestion.

Medical Uses.—Pearl Barley is used for making a decoction called Barley water, which is an excellent diet for invalids, especially when suffering from inflammation of the internal organs. Where it is wished of a more emollient and laxative nature, the addition of liquorice-root and some of the dried fruits will answer the purpose, if boiled with it. The infusion of malt has been highly spoken of as an antiscorbutic, and has also been recommended as a tonic in several diseases. The various malt liquors have been much employed as tonics and restoratives, and the Yeast formed during the fermentation of these fluids was at one time in high repute in typhoid fevers, and is still favourably thought of by several eminent practitioners. It is also used in the formation of the Fermenting poultice, so advantageous an application to fetid and sloughing ulcers.

Secale.—*Linn.*

Spikelets 2-flowered. Florets sessile, distichous, with a rudiment of a terminal one. Glumes two, herbaceous, carinated, almost opposite, awnless or awned. Paleæ two, herbaceous; the lower one awned at the point, keeled, and inequilateral; the upper shorter and bicarinate. Stamens three. Ovary pyriform, pilose. Stigmas two, sub-sessile, plumose, with long, simple, finely-dentated hairs. Scales two, entire, ciliated. Caryopsis hairy at the point and loose.

A small genus, principally peculiar to the temperate parts of Europe and central Asia. One species is much cultivated, especially in cold climates.

S. cereale, *Linn.*—Stem in a wild state short. Lower leaves and their sheaths covered with a soft down. Rachis bearded on each side with white hairs. Glumes subulate, ciliated, scabrous, shorter than the florets. Outer paleæ folded, keeled, 3-nerved, with very long awns. Nerves and awns very rough.

Linn. *Sp. Pl.* 124; Kunth, *Agrost.* 449; Lindley, *Fl. Med.* 610.
Common Name.—Rye.
Foreign Names.—Seigle, *Fr.*; Korn, *Ger.*; Segala, *It.*

Rye has been considered as a native of Crete, but it appears that another species, the *S. villosum*, was mistaken for it; at present it is thought to be originally from the countries around Caucasus. It is cultivated extensively in the north of Europe and in the United States. It is mentioned in the New Testament, and is probably the *Olyra* of Pliny. Bread made from the flour of this grain is dark-coloured, and not as digestible as that from wheat. It, however, forms a very general article of diet in some parts of Europe and this country. Rye porridge or mush is laxative, and is sometimes an advantageous diet for persons suffering from habitual constipation, and has been praised as the common food in consumptive cases.

The Rye is very subject to a disease, caused by the growth of a fungus on the grains, which produces a morbid growth. This is called Ergot, or Spurred Rye, and has been much employed of late years as a parturient, and for other purposes (see *Ergotætia*).

Belonging to this tribe is one of the few poisonous species of the order, *Lolium temulentum*, or Darnel. The seeds of this plant are acro-narcotic, and are capable of producing intoxication, and even fatal convulsions. This was known to the ancients, and hence Virgil terms it *infelix*; the Romans also thought that it induced blindness. The observations of Sarazin and others, show that the deleterious principle is volatile, as hot bread in which Darnel enters is far more dangerous than when suffered to cool. It is stated that this substance is mixed with the Opium employed in Turkey for the purposes of intoxication. The ancients used cataplasms of Darnel to stimulate indolent ulcers, and to alleviate scrofulous swellings, and obstinate cutaneous affections.

Tribe 12. Rottbœlliæ.—This large tribe contains some important and interesting plants, and among others the Sugar-cane. Many species of *Andropogon* are employed for various purposes; *A. saccharatus* is grown in India for its grain; *A. irvarancusa*, *A. schœnanthus*, *A. calamus aromaticus*, are very odorous; the last-named plant is considered by Dr. Royle to be the plant described by Dioscorides under that name, and to be the "sweet cane" and the "rich aromatic reed from a far country" mentioned in Scripture. It is employed in India as an external application in rheumatism, and is also administered as a stimulant. The roasted leaves of *A. schœnanthus* in infusion, are employed in India as an excellent stomachic. An essential oil is extracted from them in the Moluccas, and the Javanese esteem both this and the plant as an aromatic and stimulant (*Ainslie*, ii. 58). The *Anatherum muricatum* of India is also very fragrant, more especially its roots, which are used to form odoriferous fans, screens, &c. A decoction of them is said to be acrid, stimulating and diaphoretic; another species, *A. nardus*, has still more powerful roots, and is known under the name of Ginger grass.

Saccharum.—*Linn.*

Spikelets all fertile, in pairs, one sessile, the other pedicellate, articulated at the base, 2-flowered; the lower floret neuter, with one palea; the upper fertile, with 2 paleæ. Glumes 2, paleæ transparent, awnless. Stamens 3. Ovary smooth; styles 2, long; stigmas plumose, with simple, denticulated hairs. Scales 2, obscurely 2—3-lobed at tip, distinct.

Several species of this genus abound in a rich saccharine juice, and cultivated in the warm parts of Asia and America. There are numerous varieties, which are recognised as distinct species by some botanists.

Fig. 318.

S. officinarum.

S. officinarum, *Linn.*—Stem solid, tall, of different colours. Leaves flat. Panicle terminal, spreading, erect, oblong, of a grayish colour, from quantity of long loose hairs surrounding the florets; the branches alternate and spreading. Rachis striated. Florets in pairs. Paleæ smooth, membranous, of a pink colour.

Linn., *Sp. Pl.* 79; Tussac, *Fl. des Antill.* i. 23; Roxburgh, *Fl. Ind.* i. 237; Kunth, *Agrost.* 474; Lindley, *Fl. Med.* 613.

Common Name.—Sugar-cane.

Foreign Names.—Canne à sucre, *Fr.*; Zukkerohr, *Ger.*; Canna mele, *It.*

The native country of this species is not accurately ascertained, though it is probably indigenous to the southeastern parts of Asia. The Chinese date the cultivation of it from the most remote antiquity, and it appears to have also grown in Egypt at a very early period. Galen and Pliny say that *Saccharon* is a white, crystalline gum, obtained from a cane in India, and employed in medicine. Seneca and Lucan likewise speak of Indian reeds affording a kind of honey. Some writers, however, deny that

it was known to the Egyptians, Greeks and Romans, and say that it was not introduced into Arabia till the end of the 13th century. From Arabia they state it was carried to Egypt, whence the Moors obtained it, and carried it to Spain. In the 15th century it was taken to the Canary Islands by the Portuguese, and thence to the West Indies and America. It is certain that previous to 1466, Sugar was known in Europe only as a medicine. An interesting account of the Sugar-cane has been given by Dr. Macfadyen, in Hooker's *Botanical Miscellany*, No. 2.

Sugar is manufactured in the following manner. When the cane is ripe it is cut down, deprived of its top and leaves, and crushed between iron rollers. The juice is conveyed into boilers, where it is heated, with the addition of lime, and evaporated until it assumes the consistence of syrup, care being taken to remove any scum that may arise. The syrup then passes into other evaporating vessels, till it has acquired sufficient consistence, when it is poured into a wooden vessel, called a cooler, where it is constantly stirred as it concretes, so as to grain it. The sugar is then placed in hogsheads, having holes in the bottom, and permitted to drain. In this state it is termed Muscovado or Brown sugar, and the drainings, Molasses. To purify it, so as to form Refined or Loaf sugar, the raw sugar is subjected to a variety of processes, which it would be out of place to detail. (See Ure, *Dict. Article Sugar.*)

Sugar, when pure, is white, very sweet, but without odour. It is soluble in all proportions in water, but less so in alcohol. When heated it melts, and on cooling, again solidifies into a semi-transparent mass, known as Barley sugar. At a still higher temperature it is decomposed, swells, emits a peculiar odour, and becomes of a rich brown colour, when it is called Caramel. Nitric acid converts it into Oxalic acid, and diluted Sulphuric, into Grape sugar. (See *Introduction.*)

The dietetic properties of Sugar are well known. The fresh juice of the Cane is very nutritious, but somewhat laxative, as is also the raw or Brown sugar. It is usually supposed that Sugar has a tendency to cause flatulency and a morbid acidity of the stomach, but this does not seem to be the case, where it is used with moderation ; in excess, it certainly creates much disturbance of the *primæ viæ.* (See Dunglison's *Human Health*, 199, 267.)

Medical Uses.—Sugar is but little employed as a medicine, but forms a constituent of numerous compound remedies. Dr. Rush says (*Med. Inquir.* i. 370), that Sugar and Molasses, when freely used by children, are excellent anthelmintics. Sugar has likewise proved beneficial in scurvy, and in some chronic diseases of the skin. Powdered loaf sugar has been employed externally to fungous ulcers, and for the removal of specks on the cornea. As a chemical antidote it has been recommended in cases of poisoning by several of the mineral salts, but should never be relied upon, as it merely acts as an emollient and demulcent.

Class IV.—Sporogens, or Rhizanthous Plants.

Parasitical plants, having cellular scales instead of true leaves. Stem lost in the tissue of the plant, and having few or no spiral vessels. Furnished with true flowers, having stamens and carpels, and surrounded with a trimerous or pentamerous calyx, or wholly naked. Ovules similar to those of other flowering plants. True nature of seeds not understood; by some said to be a mass of spores, by others to be a cellular nucleus abounding in grumous corpuscles; but certainly in some instances having a minute, undivided embryo, enclosed in a mucilagino-granular albumen.

Very little is known regarding this extraordinary class, and botanists are by no means in unison, either as respects its structure or its true station

in the vegetable kingdom; some, in fact, as Brown and Griffith, do not consider that it is to be regarded as a peculiar class, but think that it appertains to the Exogens; most other writers of eminence agree in opinion that it is sufficiently distinct to be elevated to a separate rank (see Lindley, *Veg. Kingdom*, for a synopsis of the various views of Brown, Griffith, Endlicher, Richard, &c.)

Very few of them have any decided properties yet known. The *Cynomorium coccineum*, or *Fungus melitensis* of the older writers, had at one time much reputation as a styptic, and some species of *Helosis* have the same properties. *Ombrophyton*, which springs up in Peru like a mushroom, according to Pöppig, is eaten, when cooked, and said to resemble Indian corn in taste. *Sarcophyte*, a native of the Cape of Good Hope, is stated to have an extremely fetid odour. *Cytinus hypocistis*, found in the South of Europe, affords an extract which is officinal in some countries, under the name of *Succus hypocistidis;* it is astringent and tonic, and is prescribed in gonorrhœa, hemorrhages, &c. According to Pelletier (*Bull. Pharm.* v. 293), it contains gallic acid, but no tannin, though it is capable of precipitating gelatine. *Hydnora africana* is said to smell like spoilt roast beef, but is eaten by the Hottentots.

Order 119.—RAFFLESIACEÆ.—*Lindley.*

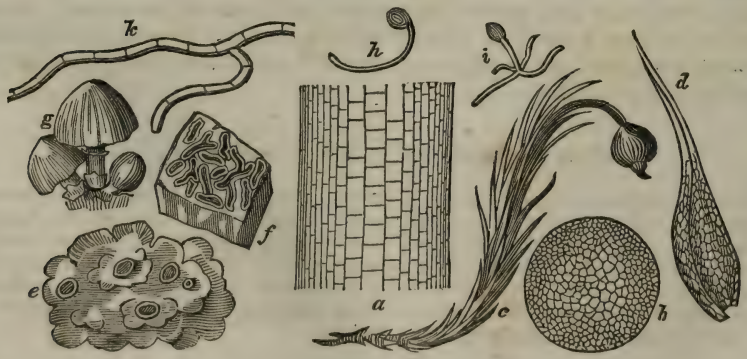
Fig. 319.

R. arnoldi.

One of the most interesting plants of this class is the *Rafflesia arnoldi*, a native of Java. The flower of this species is larger than that of any other known vegetable, its diameter sometimes being upwards of a yard, and its weight fifteen pounds. A decoction of it is employed in Java as an astringent in a relaxed condition of the genito-urinary apparatus. *Brugmansia*, Blume, is said to have analogous properties.

Series II.—Cryptogamous or Flowerless Plants.

Fig. 320.



a. Longitudinal section of a stem. *b.* Transverse do. *c.* Stem of a moss with leaves and theca. *d.* Leaf of a moss magnified. *e.* Leafy thallus of a lichen with shields. *f.* Crustaceous do. do. *g.* Fungi of the higher tribe. *h. i.* Fungi of the lower tribes. *k.* Conferva magnified.

Floral envelopes and sexual organs absent, or not discernible. Reproduced by minute bodies called *spores*, usually enclosed in cases, *thecæ* or *sporangia*, or irregularly dispersed about the plant. Spores having no radicle, plumule, or cotyledon, germinating indifferently in any direction, and striking root from any part of their surface.

Class V.—Acrogens, or Acrogenous Plants.

Flowerless plants with a regular stem or axis growing from the apex, not increasing in diameter; composed of cellular tissue and vessels, but sometimes of the former alone; usually furnished with leaves. Spores contained in a theca.

Group LII.—Filicales.

Order 120.—POLYPODIACEÆ.—*Brown.*

Usually with a creeping rhizome; sometimes with an erect, arborescent stem. The leaves (*fronds*) circinate in venation, entire, or variously divided. Thecæ arising from the veins of the leaves, situated at their back or margins, often collected in clusters (*sori*), either naked or covered with a transformed margin of the frond, or with a scale (*indusium*). *Thecæ* 1-celled, containing innumerable spores; dehiscing irregularly, and somewhat different in the several sections of the order.

Ferns are found in various parts of the world, but abound most in the tropical islands of both hemispheres. The tree ferns are found as high south as 46°, but have never been found further north than the tropic. Their leaves and rhizomes usually contain a peculiar and astringent mucilage, which in some species has a little aroma. Many of them have been used as medicinal agents to fulfil several indications.

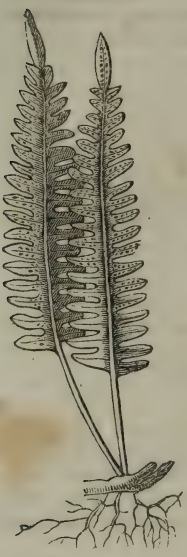
Besides the Male Fern, the following species have been more or less employed. Several species of *Adiantum*, as the *pedatum*, *capillus-veneris*, are considered as pectoral and demulcent, and form the basis of the syrup called Capillaire, so much used in France and Germany in diseases of the respiratory organs, and as a vehicle for the administration of disagreeable remedies. Ainslie (*Mat. Ind.* i. 52) states that a strong decoction of the latter of these plants is decidedly emetic. *A. fragile*, of Jamaica, is said by Browne (*Lunan. Hort. Jam.* i. 475) to be efficacious in phthisis and in an ulcerated and relaxed state of the glands of the throat. *A. trapeziforme* is used in the West Indies as a substitute for the *A. capillus-veneris*. *A. melanocaule* (*Ainslie*, ii. 214) is considered by Hindoo practitioners as having tonic powers.

Fig. 321.

A. capillus-veneris.

Some of the species of *Polypodium* appear to have more energetic powers. *P. vulgare*, a native of Europe, as well as of this country, was anciently esteemed as a purgative in obstructions of the liver; and it was also supposed useful in gout, colic, and even mania. It is likewise said to be expectorant and diuretic. Though formerly universally employed, it is now seldom resorted to; yet from the results of analyses of it by Planche and others, it is probable that it is possessed of some activity. The part used is the rhizome, which, when fresh, is sweetish, but when dried is bitter. *P. calaguala*

Fig. 322.



P. vulgare.

and *P. crassifolium*, both natives of Peru, according to Ruiz are possessed of very efficient deobstruent, sudorific, and anti-venereal properties, and were highly esteemed by the inhabitants. They are used in decoction or infusion. The experiments made with them in Europe by Carminati, resulted in his belief that they were not more active than the *P. vulgare;* but Ruiz states that he must have used some other species, as the roots imported into Europe come from the Isle of France. When genuine, they are extremely bitter. *P. phymatodes* is employed in the South Sea Islands to perfume cocoa-nut oil; and *P. repandum* and *P. simile*, in China, as astringents, anthelmintics, &c., according to Loureiro (*Fl. Cochin.* 827).

Acrostichum huacsaro is stated to have much the same powers as the Peruvian species of Polypodium, just noticed. *A. flavens*, is used in South America as a laxative, and *A. fucatum*, is a favourite food among the aborigines of New Holland; the root is very large. The rhizomes of *Pteris esculenta*, *Diplazium esculentum*, *Cyathea medullaris*, and *Gleichenia hermanni* are also used for the same purpose in different countries. *Pteris aquilina* is stated to be anthelmintic, and *Osmunda regalis* to be tonic and styptic, and to have been found serviceable in rachitis.

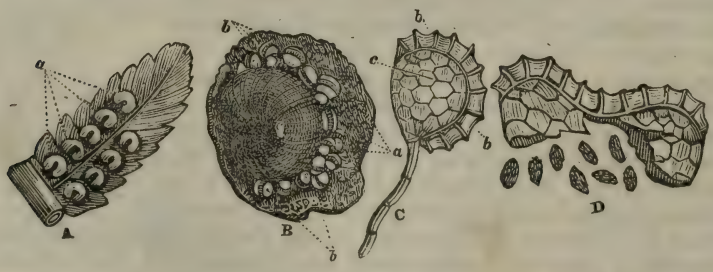
Nephrodium.—*Richard.*

Sori roundish, scattered. Indusium obiculari-reniform, fixed by the sinus.

N. filix mas, *Richard.*—Fronds bipinnate, pinnules oblong, obtuse-serrated; stalk and midrib chaffy. Sori near the central nerve.

Richard, *Elem. Hist. Mat. Med.* i. 290; Lindley, *Flor. Med.* 619; Pereira, *Mat. Med.* ii. 56; *Polypodium filix mas*, Linn. *Sp. Pl.* 1551; *Aspidium filix mas*, Schwartz, *Syn.* 55; *Eng. Bot.* 1558; Hooker, *Fl. Scot.* 154.

Fig. 323.



N. filix mas.

A. Pinnule with sori. B. Magnified portion with sporangia. *b b* Sporangia partially covered by *c* indusium. C. Magnified sporangium. *a* Stalk. *b* Ring. *c*. Membranous sac. D. Sporangium ruptured and spores escaping.

This fern occurs in many parts of Europe, Asia, North of Africa, and in the United States, growing in woods and in shady places. The part used is the rhizome; this as found in the shops, is of various sizes, the largest of

which are about six inches in length, and an inch broad, are the best; in general, what is offered for sale, consists of remains of leaf-stalks, with small fragments of the rhizome attached. Internally the rhizome is yellowish or reddish-white, and externally of a brown colour. The odour is slight and earthy, and the taste, somewhat sweetish, but bitter, astringent and unpleasant. It has often been analyzed; the last examination by Geiger, shows it to contain: Green fat oil, 6·9; Green resin 4·1; uncrystallizable sugar and tannin, 22·9, &c. The active principle is the oil. This oil also occurs in the buds, according to Peschier.

Medical Uses.—It is only used as an anthelmintic, for which purpose it was employed amongst the ancients, but its principal reputation arose from its forming the basis of a celebrated nostrum for expelling the tape-worm, the secret of which was sold to Louis XVI. by Madame Nouffer, for about $3500. Her plan was to give a dose of the powdered root, followed by an active cathartic; this to be repeated from time to time until the desired effect was produced. This remedy was very popular for some time, and proved successful in many cases, but is now seldom used, as other remedies of more decided benefit have been substituted for it; though from the evidence in its favour by Peschier, Ebers, &c., it is certainly an active anthelmintic. It appears to be best in a fresh state, and that it deteriorates by keeping so much, that in two years it is inert.

It may be given in powder in doses of from one to three drachms, twice a day; in extract, from twelve to twenty grains; and in the oil, from half a drachm to a drachm. Peschier has found that an ethereal tincture of the buds, made by digesting 1 part of the buds in 8 parts of ether, is very effectual.

Group LIII.—Lycopodales.

Order 121.—LYCOPODIACEÆ.—*De Candolle.*

Moss-like plants with creeping stems and imbricated leaves; the stems abounding in annular ducts; or stemless plants with erect subulate leaves, and a solid stem. Spore cases 1—3-celled, sessile, axillary or terminal, and forming a kind of ament; dehiscent, and containing either minute powder or larger sporules.

The plants of this order are found in all parts of the world, and like the Ferns are most abundant in warm moist situations in the tropics, and especially in the islands of that region. They are endowed with somewhat active powers, and have been employed as remedial agents in many countries.

Lycopodium.—*Linn.*

Thecæ unilocular, all of one form, or of two different forms; that containing the powder somewhat kidney-shaped, and 2-valved, that containing the larger sporules 3—4-lobed, 3—4-valved.

The dust from the spore cases is very inflammable, and that from the European species is employed to imitate lightning in theatrical representations. *L. clavatum* has been given in decoction in a variety of diseases, as a diuretic, antispasmodic, &c., and has been praised as serviceable in hydrophobia. The powder is emetic, but is principally employed instead of starch, to prevent excoriations in young children; it is also said to be the most efficacious application in cases of Plica polonica. *L. cernuum* is employed in some of the West India islands as a diuretic, and in vinous decoction in

dysentery and other bowel affections. (*Flor. Med. Antill.* iv. 73.) *L. selago* is regarded as very active, and some cases of poisoning with it have been recorded; in small doses it acts as an emeto-cathartic, and in over quantity like the acro-narcotics. A decoction is employed in Sweden to destroy vermin on domestic animals. When mixed with lard it forms an irritating ointment, which has been used as a dressing to foul ulcers, and to keep blisters open.

L. catharticum of Peru is regarded in that country as a most violent purgative, and is said to have been administered with much success in elephantiasis. *L. phlegmaria* is reputed to be aphrodisiac, and *L. hygrometricum*, according to Martius, (*Jour. Chim. Med.* vi. 213,) is eminently so. This plant is remarkable for its hygrometrical properties, closing its leaves so as to form a ball, when dry, and spreading them out when moistened.

Class VI.—Thallogens or Thallogenous Plants.

Flowerless plants, wholly composed of cellular tissue, with no distinction of stem, root or leaves; not growing by buds, nor furnished with reproductive organs analogous to flowers.

Group LIV.—Algales.

Order 122.—FUCACEÆ.—*Lindley.*

Fluviatile or maritime plants. Frond monosiphonous, consisting of a single cell, or polysiphonous, of several cells, various in form; barkless or with a bark, jointed or continuous, thread-shaped or of various configurations. Mode of growth by a division of the cells; branching by lateral increase. Mode of increase by spores, contained in superficial cells, which are often vesicular, growing singly out of a thin colouring matter; and consisting of a single nucleus included in its proper cellular membrane, (*epispore*), and discharged by the opening of a transparent mother cell (*perispore*). Vesicles scattered through the whole frond, or seated on particular parts of it, sometimes on a particular receptacle.

Fig. 324.

Fucus vesiculosus.

a Upper part of frond. *b* Section of a receptacle. *c* Tubercle. *d* Filaments and sporangia composing the tubercle. *e* Filaments which issue from pores on the surface of the frond.

The Fuci or sea-weeds are found in all parts of the world; some of them appear almost to be cosmopolites; others occur in immense beds floating on the surface of the sea in certain limits, and are often of gigantic size; thus *Scytosiphon filum*, common in the North Sea, is frequently from 30 to 40 feet in length. Bory de St. Vincent states that *Lessonia fuscescens* is from 25 to 30 feet long, with a trunk as thick as a man's thigh. But the giant of the race, and in fact of the vegetable kingdom, is *Macrocystis pyrifera*. This is said to attain a length of 1500 feet; the leaves are long and narrow, and are furnished with vesicles filled with air by which they float; the stem is slender, not being thicker than the finger.

The Sea-weeds are valuable as furnishing large quantities of Kelp or Soda, as being the source from which Iodine is procured, and also as affording wholesome food. The ashes of the whole of the species contain Soda and more or less Iodine, and it is to the presence of these two bodies, that the Fuci owe their medicinal properties in scrofula and glandular swellings.

Iodine is extracted from the mother liquor of Kelp, made from a variety of maritime plants, but principally from those of this order and the next. Among these, the species of *Rhodomenia* and *Laminaria* afford the most. (See Pereira, *Elem. Mat. Med.* i. 230.) But much is obtained from several species of Fuci.

Among the edible species may be mentioned *Alaria esculenta*, extensively used as food in Ireland, Scotland, Iceland, &c., as are also the young stalks of *Laminaria digitata* and *L. saccharina;* these are called Tangle. In Asia, *Sargassum acanthocarpum* and *pyriforme*, with *Laminaria bracteata*, and, in the Sandwich Islands, *Sargassum cuneifolium*, are in like manner used for food. But the largest proportion of the nutritious sea-weeds belong to the next order.

Order 123.—CERAMIACEÆ.—*Lindley.*

Sea-weeds, usually of a rose or purplish colour. Cells long and tubular, or round and short, or polygonal, sometimes arranged in a single row; sometimes disposed in several parallel rows, forming an articulated frond, or if unequal lengths, forming a cellular frond. Their propagation is by spores (sphærospores and tetraspores) collected in fours or threes within a transparent perispore, in bodies of different forms and structure.

Fig. 325.

a. Rhodomenia palmata. *b.* R. ciliata. *c.* Laminaria saccharina. *d.* Iridæa edulis. *e.* Alaria esculenta. *f.* Ulva latissima.

The species of this order, like the last, are found in all parts of the world, but are most frequent between 35° and 40° N. Lat., and are comparatively rare in the southern hemisphere. They are mostly very gelatinous, and hence are valuable as food. One of them, *Chondrus crispus*, or *Carrageen*, has been recognised as officinal, though it does not appear to be superior in its demulcent or nutritive qualities to several others of the order. From an analysis of it by Herberger, it is shown to contain large quantities of a peculiar vegetable

jelly, which is called by Pereira, *Carrageenin*. This has been a popular emedy in pulmonary diseases, in bowel complaints, &c., and has also been used as a substitute for Isinglass, in culinary preparations. *Plocaria tenax*, and *P. candida*, probably furnish the material from which Swallows construct the edible nests so prized by the Chinese; some writers, however, are of opinion, that they are formed from a species of *Gelidium*. *P. compressa* of Ireland and Scotland is also used as Carrageen. The *P. tenax* just spoken of, affords a glue much used by the Chinese for a variety of purposes. *Rhodomenia palmata* is the Dulse of the Scots, and Dillesk of the Irish, and is extensively employed as food throughout all the maritime parts of Europe, as is also the *Iridæa edulis*. *Laurentia pinnatifida*, is very pungent, and is known as Pepper Dulse in Scotland.

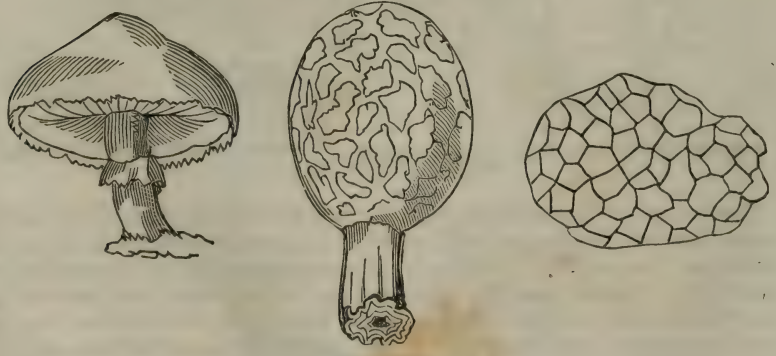
Several of them have been used in medicine, especially the *Plocaria helminthocorton*, or Corsica Moss, a native of the Mediterranean, and once much esteemed as a vermifuge; and has also been brought forward as a remedy for cancer, in consequence of its having been stated by Bonaparte to Dr. O'Meara, that it was employed in Corsica in the treatment of tumours; but its only virtue for this purpose is owing to the Iodine it contains. *Hypnæa musciformis* is also esteemed as an anthelmintic in the Greek Archipelago. The *Plocaria candida*, or Ceylon Moss, has of late years been employed as a light and nourishing article of diet in England and France.

Group LV.—Fungales.

Flowerless plants, consisting of cellular tissue, with occasionally some filaments intermixed; increasing in size by additions from within; living in air. Propagated by spores either lying loose among the tissue, or enclosed in membranous cases (*sporidia*).

Fungi are found everywhere, usually growing upon decaying or decayed animal or vegetable substances, but sometimes, especially the lower groups of them, springing from living bodies of either kingdom. The number of species is so immense, that no opinion as to it can be safely hazarded. Their qualities and uses are exceedingly diversified, for whilst many are favourite articles of food, a still greater number are unwholesome and poisonous; some are medicinal, and others again have tinctorial qualities.

Fig. 326.



Edible Fungi.

1. Agaricus campestris. 2. Morchella esculenta. 3. Tuber cibarium.

Among the edible fungi, what are called Mushrooms are the best known; these are different species of *Agaricus*, but principally the *A. campestris*, *A. deliciosus*, &c.; many of the species of this genus, on the other hand, are exceedingly poisonous, and are known as Toadstools. The "Oronge" of the French, is the *Amanita aurantiaca*; this is wholesome and delicious, whilst most of the other species are extremely poisonous. The *Morchella esculenta*, or Morelle, is highly esteemed in Canada, and the *Tuber cibarium*, or Truffle, has a universal reputation. In this country very few species are eaten, in England rather more, whilst in Russia from thirty to forty different kinds are made use of. A long list of works might be cited on the eatable and deleterious species, but the most complete is that of Roque (*Hist. des Champig. Comestibles et Venemeux*). It is impossible to decide, except from experience, which are wholesome and which unwholesome, and it would even appear that the same species may be one or the other according to circumstances.

Fig. 327.

Poisonous Fungi.

a. Agaricus vernus. *b*. A. phalloides. *c*. A. porphyrius. *d*. A. vaginatus. *e*. A. nivalis. *f*. A. muscarius. *g*. A. pantherinus.

The poisonous fungi are exceedingly numerous, and when eaten produce the usual symptoms of the acro-narcotics. No specific antidote is known; the only mode is to cause their speedy evacuation from the body, and to conduct the subsequent treatment according to the symptoms that may be present. One of the most poisonous of the Fungi, is the *Amanita muscaria*, yet even this is used in some parts of Asiatic Russia, for the purpose of producing intoxication; one or two small ones will cause drunkenness for a whole day, more especially if a fluid be taken immediately after them. But its most singular property is the effect it produces on the urine, which becomes so imbued with the active principles as to cause the same symptoms as the fungus itself: thus, if a man is intoxicated one day from taking the plant, and have slept himself sober, next morning, as is the custom, drinks a cup full of his urine, he will be still more drunk than he was the preceding day. The intoxicating property of the urine is also capable of being propagated, and Dr. Langsdorf mentions that the full effects may be transmitted through five individuals. Thus with a few of these fungi, a party may keep up their debauch for a week.

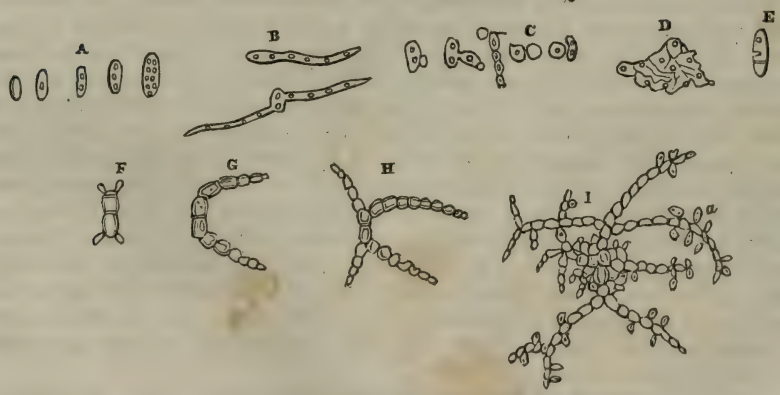
Some of the fungi are employed as remedial agents; thus the internal spongy portion of several species of *Polyporus*, when beaten till soft, is used as a styptic to restrain bleeding; it has also been recommended as a support

to tender parts liable to excoriation, as it always retains its elasticity; when soaked in a solution of nitre, it forms the *Spunk* or *tinder* so much used.

P. laricis was at one time frequently prescribed as a drastic purgative, and was highly spoken of by many writers, but at present is seldom used. De Haen considered it to be a specific in phthisis, and Galen asserted that it would check hæmoptysis. The *Boletus suaveolens*, which has an odour of vanilla, was also much celebrated as a remedy in phthisis, and numerous cases are recorded in which it was thought to have effected a cure. De Candolle states that its powder was mixed with honey into an electuary, of which from a scruple to a drachm a day were administered. Linnæus says that this species is thought by the Laplanders to be aphrodisiac.

The only really important medicinal article of this class, is the *Secale cornutum*, or *Ergot*, or Spurred Rye. Much difference of opinion has existed as to the real nature of this substance; some considered it the result of an injury to the seed of the Rye, from the puncture of an insect, and a subsequent morbid change and growth, thus resembling the galls produced on the oak; others thought it was a true fungus arising between the glumes of graminaceous plants, and it was variously named and classed by different writers, as: *Spermœdia clavus*, Fries; *Clavaria clavus*, Mänch; *Sclerotium clavus*, De Candolle; but, in opposition to this, it has been shown that in some cases a part only of the grain is ergotised, and that the remains of a stigma are often observable at its apex; others again supposed it to be a disease of the grain arising from moisture, &c.; and, lastly, it has been referred to the attacks of a parasitic fungus, which causes such an alteration in the grain as to change its whole character. This opinion, which is supported by the strongest evidence, was first promulgated by Leveillée, in 1826, and has been subsequently confirmed by the observations of several naturalists, and, more especially by Mr. Quekett (*Trans. Linn. Soc.* xviii.), who, from an examination of the diseased grain, in its earliest stages, observed that the germ and its appendages, became covered with a white coating, composed of multitudes of sporidia, mixed with cobweb-like filaments. This fungus he has named *Ergotœtia abortifaciens*, and describes it as follows: "Sporidia elliptical, moniliform, finally separating, transparent, and seldom containing more than one, two, or three well-defined granules."

Fig. 328.



E. abortifaciens.

A. Sporidia. B, C, E, F, G, H. Different modes of reproduction in water. D. Membrane of sporidium laid open. I. Fungus assuming a radiated form, and developing sporidia *a*.

By the occurrence and growth of this fungus upon, or within the germs of the grasses, a diseased condition is induced, involving the whole embryo and albumen, which, when taking place on the Rye, is termed Ergot, or spur. This white dust is capable of producing the same disease on any of the graminaceous plants, when placed in contact with their seeds, or even when sprinkled on the soil in which they are planted.

If a diseased grain be examined under the microscope, when about half-grown, the fungus will be seen just above the paleæ, of a purplish-black colour; at this period, some of its white coating has disappeared, and the sporidia and filaments are no longer produced. At the upper part of the grain, the coating presents an undulated, vermiform appearance, which Leveillée thought was the true fungus, and named *Sphacelia segetum;* but which Mr. Quekett states are merely masses of sporidia.

Fig. 329.

A. Side view of a longitudinal section of an infected grain, soon after fecundation. B. Front view of a section of same grain, divided at *a*. C. Do. cut at *b*. D. An unripe, but advanced grain, showing at the upper part, the vermiform tuberculated portion. E. Section of the same. F. Full-grown Ergot, in its envelopes.

Almost every species of the Graminaceæ are liable to the attacks of this fungus, and it also extends its ravages to the Cyperaceæ, and even to the Palmaceæ. The Indian Corn is peculiarly subject to it, and the Ergot it produces is fully as powerful in its influence on the system as that furnished by the Rye.

Ergot when mature projects considerably beyond the envelopes of the grain, and varies much as to numbers, in different heads; in some being solitary, whilst, in others, it wholly occupies the spike. When gathered for use it appears to be a solid, brittle, yet somewhat flexible grain, varying in length from a few lines to an inch and a half, and in breadth from half a line to four lines. Its form is cylindrical or somewhat prismatical, tapering towards the extremities, curved like the spur of a cock, unequally furrowed, on one or two sides, sometimes irregularly cracked and fissured. It is of a purplish-colour externally, and of a yellowish or grayish-white within. The

Fig. 330.

Secale cornutum.

smell is peculiar, nauseous. The taste, at first, is very faint, but becomes bitterish, acrid, and disagreeable. When perfectly dry it is brittle and readily pulverised. It deteriorates much by keeping, and more especially when exposed to the action of the air; and is also destroyed by the attacks of a small insect which feeds upon it.

It has often been analyzed since its first examination by Vauquelin in 1816; the best account of its constituents is by Wiggers; he found it composed of: Ergotin, a peculiar Fixed oil, Fatty matter, Cerin, Fungin, &c. Ergotin has a heavy odour and disagreeable, acrid taste, and was supposed to be the active principle; but this is shown to reside in the fixed oil, which is of a yellow colour, acrid, and poisonous; M. Bonjean, however, states that there are two active principles; one, the oil; the other, contained in the watery extract: this is brown, of a thick consistence and musty smell, and has very decided anti-hemorrhagic properties.

The medical powers of Ergot are various: given in small doses, it causes little effect upon the male, whilst in the female, it produces powerful contraction of the uterus. In large quantities, many observers state, that it acts like an acro-narcotic on both sexes. Where its use is long continued, in small quantities, as when ergotised grain is eaten, it is capable of inducing the most dangerous and fatal consequences. Several devastating epidemics which have occurred in Europe, have been ascribed to the use of bread made from grain infected with Ergot. This Ergotism, as it has been called, assumes two forms: one attended with convulsions, and the other with a dry gangrene of the limbs.

The principal employment of Ergot as a medicine is to promote the action of the uterus, where its natural powers are inefficient in parturition. Its efficiency in such cases was long known to midwives in various parts of Europe, but it was first introduced into regular practice by Dr. Stearns, in 1807 (*New York Med. Rep.* xi.), since which it has been very generally used both in this country and Europe. Although it fails in some cases to excite any action in the uterus, in the larger proportion of cases it operates powerfully, and hence should always be employed with caution, and a due regard to the condition of the parts, or serious consequences might ensue. The cases to which it is applicable are those of lingering labour, where the soft parts are dilatable, the os uteri sufficiently open, but the powers of the uterus are not sufficient to expel the fœtus. It has also proved useful, when, from some cause, it is of importance to hasten delivery; also, to provoke the expulsion of the placenta, where this is retained from inertia of the uterus; it has like-

wise been of benefit in causing the expulsion of clots, hydatids, &c.; nor has it been without use in restraining uterine hæmorrhage, whether puerperal or non-puerperal.

It has also been employed in amenorrhœa, leucorrhœa, gonorrhœa, &c., and many cases have been published in corroboration of its remedial properties in these diseases. Of late years it has attracted much attention for its anti-hemorrhagic virtues, and numerous instances are given where it has been eminently beneficial as a styptic. A full account of its various applications will be found in Dunglison's *New Remedies*, 265, and Pereira's *Elements of Materia Medica*, ii. 71.

It is administered in a variety of forms: in powder, in doses of about a scruple every twenty minutes, till its effects are produced, or till about a drachm is given; in infusion, made with a drachm of Ergot to four fluid ounces of water, one-third to be given at a time, and repeated, as above. Where it is administered for other purposes than promoting contractions of the uterus, the doses to be smaller. A tincture is sometimes given in fluid drachm doses. The oil is effective in from 20 to 50 drops.

Group LVI.—Lichenales.

Perennial plants, spreading over the surface of the earth, rocks, trees, &c., in dry places, in the form of a lobed and foliaceous, or hard and crustaceous or leprous substance, called a thallus. This thallus is composed of two layers, a cortical and a medullary; the former merely cellular, the latter cellular and filamentous. Reproductive matter of two kinds: 1st. Sporules naked, or lying in membranous tubes (*thecæ*), and immersed in small disks called shields; 2d. Of separated cellules of the medullary layer, of a green colour, and called *gonidia*.

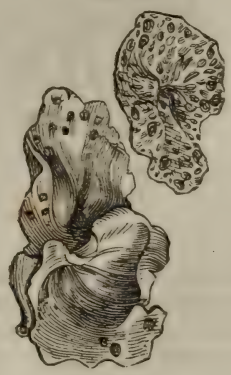
They are found in all parts of the world, but their principal abode is in temperate regions. Lichens have two distinct classes of characters: one making them nutritive, and medicinally useful; the other rendering them excellent dyes, after they have undergone certain preparations. They are said to contain several peculiar principles, as *Cetrarine*, *Stictine*, *Varioline*, &c.; but their nutritive properties are owing to an amylaceous substance, more analogous to gelatine than to starch; this has received the name of *Lichenine*.

Among the alimentary and medicinal species, the best known are the following.

Fig. 331.

C. islandica.

Fig. 332.



Gyrophoræ.

CETRARIA ISLANDICA.—Thallus erect, tufted, olive-brown, paler on one side, laciniated, channelled, and dento-ciliate; the fertile laciniæ very broad. Shields brown, appressed, flat, with an elevated border.

This is found in exposed situations, in northern countries, in both hemispheres. When dried it has no odour, and a mucilaginous, slightly bitter taste. It is a mucilaginous or demulcent tonic, with no astringency, and has been thought useful in pulmonary complaints, when freed from the bitter principle by steeping in a weak alkaline solution. It is capable of forming a jelly by boiling in water or milk; this jelly, when properly flavoured, forms an agreeable and nutritious diet. In the fresh state, and without any preparation, Sir John Franklin found that it was scarcely eatable, from its great bitterness, though he and his party were then suffering great privations (*Narrative*, 414).

Sticta pulmonaria has much the same properties, and has obtained some reputation as a remedy in pulmonary affections. Its nutritive qualities are not as great as those of the Cetraria. *Gyrophora proboscidia* and *G. cylindrica*, natives of the more northern regions, are used by hunters and travellers in the Arctic regions as articles of food, under the name of *Tripe de Roche*. These are nutritious, but unpleasantly bitter, and often cause severe colic and other affections of the digestive organs (*Long's Second Expedit.*) *Peltidea aphthosa* is said to be purgative and anthelmintic, and several species of *Variolaria* to be useful as febrifuges in intermittent fevers; as is also *Parmelia parietina*. *Borrera furfuracea* is in like manner reputed to be astringent and febrifuge, which is also the case with some species of *Scyphophorus*. Several species of *Cladonia* are also used: the *C. sanguinea*, according to Martius, is much esteemed in Brazil as a remedy for aphthæ in children, for which purpose it is rubbed down in sugar and water; *C. vermicularis* is used in the same country as a stomachic, and is called *Contrayerba blanca*. The best known, however, is the *Cladonia rangiferina*, or Reindeer Moss. This species is very nutritious, and has very little of the bitterness of most of the Lichens. It forms the principal food of the Reindeer during the winter, and is also eaten by the Icelanders and Laplanders, who form jellies from it by boiling it with milk.

Fig. 333.

C. rangiferina.

Fig. 334.

L. tartarea.

Some of the Lichens are much used in the arts, as affording dyes. This is owing to the presence of a peculiar principle, called *usnine* or *usnic acid*, which exists in them, accompanied by yellow and green resins, and which, with them, have the property of becoming of various shades of colour when

acted upon by ammonia. These resins have been examined by Dr. Kane and other chemists, and have received a variety of names.

The blue dye known under the name of *Archil* or *Orchil*, is principally prepared from *Rocella tinctoria*, but other kinds of Lichen are also used. Litmus or Lacmus, and Cudbear, are prepared from *Lecanora tartarea*, *L. parellus*, &c. This article is of a blue colour, and is employed as a dye, and also as a test for acids and alkalies; the former changing its solution to a red, and the latter restoring the original blue colour, when thus reddened. Numerous other species might be mentioned as producing dyes, but it may be sufficient to say, that all the crustaceous kinds are useful, and many of the foliaceous.

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From what I have seen of it, I think the design and execution of the work admirable, and, at the proper time in my course of lectures, I shall exhibit it to the class, and give it a recommendation worthy of its great merit.

From H. H. Smith, M. D., Philadelphia.

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